

Associations between Community Violence and Academic
Competency in Urban Elementary School Children

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Abstract

The overall goal of this dissertation is to assess the associations between exposure to community violence and academic achievement using a community-based sample of urban school children. Aim One of this dissertation assessed the joint effects of community violence exposure and the school context on academic achievement. Propensity score weights were used to examine three pairwise comparisons. There were not significant differences in math proficiency between the high exposure to violence/low performing school group or the low exposure to violence/low performing school group. There were significant differences in math proficiency levels in the high exposure to violence/low performing school vs. high exposure to violence/high performing school and high exposure to violence/low performing school vs. low exposure to violence/high performing school comparisons. The mean differences from comparisons were comparable suggesting that most of the gains came from attending a high performing school. Aim Two examined the associations between academic, behavioral, and social competences on standardized test performance using a latent class framework. A three-class model was the best fitting solution for boys; the classes included a High Performing class, a Disruptive Behavior/Low Performing class, and a Low Social Skills/Low Performing class. Boys in the High Performing class performed better on their concurrent Reading and Math MSA standardized tests.. A three-class solution was also the best fitting model for the sample of girls; the classes included a High Performing class, a Poor Social Skill/Average Performing class, and an Internalizing/Average performing class. Boys in the High Performing class performed marginally better on the Reading and Math test than boys in the other two classes. Aim Three used latent class regression to examine significant predictors of the latent classes developed in Aim 2. For boys, community violence victimization was significantly associated

with membership in the Disruptive Behavior/Low Performing class. For girls witnessing neighborhood violence and feelings of neighborhood safety were significantly associated with membership in the Poor Social Skills/Average Performing class. Witnessing community violence increased the risk of belonging to the Poor Social Skills/Average Performing class, but feeling safe in their neighborhood reduced the risk of belong to the Poor Social Skills/Average Performing class.

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Chapter 1. Introduction

1.1 Problem statement: Academic Achievement as Public Health Issue

Early academic failure in elementary school has significant life course implications; both academic and social trajectories that influence the rest of a student's academic experience begin to develop in elementary school (Entwisle, Alexander, Pallas, & Cadigan, 1987). For children to succeed in school they must demonstrate academic competence along with behavioral and social competencies. Success across all three domains (academic, behavioral, and social) early in school significantly increases the likelihood that a child will continue to be successful in middle and high school. Beyond limiting latter academic achievement, early academic problems may spillover into other developmental domains increasing the risk for social, physical, and mental health problems in adolescent and adulthood. The antecedents and consequences of academic success and failure have been studied extensively by education researchers, but the consideration of the public health implications of academic achievement is limited.

There are important consequences associated with low academic achievement in early grades. Low performing students may be placed into school tracking programs, limiting future opportunities for more advanced coursework and many school districts restricts participation in school-sponsored extra-curricular activities (Crosnoe, 2002; Dornbusch, Glasgow, & Lin, 1996). Both tracking and restrictions on extra-curricular activities limit opportunities for positive peer interactions (Entwisle et al., 1987). Poor grades, early course failure, and grade retention are also significant predictors of high-school drop-out. Early

academic problems also increase the risk of later social and emotional problems including attention deficit hyperactivity disorder, anxiety, and major depressive disorder, and strain parent-child interactions (Velez, Johnson, & Cohen, 1989). Low achievement is associated with higher risks of delinquent and antisocial behavior and substance use, including tobacco, illicit drugs, and marijuana (Bachman et al., 2007). Educational attainment is a strong predictor of adult health outcomes; more years of formal education is associated with lower mortality rates, higher levels of obesity, and less risky health behaviors. Finally, early patterns of academic failure mirror larger societal patterns of inequality in health and income (Crimmins & Saito, 2001; Needham, Crosnoe, & Muller, 2004). High levels of academic failure also have population level effects; low rates of academic achievement are associated with fertility, morbidity and mortality, marriage, and unemployment rates through the reduced development of human capital (Becker, 1962; Mirowsky & Ross, 2003).

1.2 Risk and Protective Factors for Academic Achievement

One of the strongest predictors of poor academic achievement is coming from economically disadvantaged background or belonging to a racial or ethnic minority group. Studies have found that minority, urban students fall 30 to 50 percentage points behind White students (Balfanz & Byrnes, 2006). Both poor academic performance and the gap in achievement between White and minority students is multi-factorial in cause; multiple developmental domains (e.g. individual, peer, family, neighborhood, and school) influence early school performance and risk and protective factors have been found at each level of influence.

Both schools and teachers account for significant variation in academic achievement. Researchers have found that together teachers and schools can account for between 30 to

60% of the observed variability in reading and math test scores (Konstantopoulos, 2005; Nye, Konstantopoulos, & Hedges, 2004). In addition to low socioeconomic status and being a minority, student level risk factors include having an adolescent mother, living in a single-parent home, high levels of stressful life events such as the death of a parent or divorce, and associations with deviant peer groups (Alexander, Entwisle, & Kabbani, 2001; Crosnoe, Erickson, & Dornbusch, 2002; Crosnoe, Mistry, & Elder, 2002; Kaplan, Peck, & Kaplan, 1994; Pungello, Kupersmidt, Burchinal, & Patterson, 1996)

Understanding the causes and consequences of early academic problems can inform school-based interventions and policies that promote early academic success. Many school and individual level factors contribute to academic performance, but there is also considerable evidence that a child's early social context may be an equally important influence on early school success (Entwisle, Alexander, & Olson, 2005). The primary focus of this dissertation is to examine a specific risk in a child's social ecology, exposure to community violence, and its associations with academic achievement.

1.3 Community Violence Exposure and Academic Achievement

The rationale for studying the associations between community violence and academic achievement is that community violence is a pervasive and significant public health problem (*World report on violence and health*, 2002). National estimates indicate that nearly 80% of urban youth have witnessed or directly experienced some form of violence in their community (Cooley-Quille, Turner, & Beidel, 1995; Kilpatrick, Saunders, & Smith, 2003; Klierer, Lepore, Oskin, & Johnson, 1998). Moreover, longitudinal data show that rates of community violence tend to be stable over time, so children's experience with community

violence tends to be chronic and influence development across the lifespan (Gorman-Smith & Tolan, 1998).

Community violence consists of "deliberate acts intended to cause physical harm against a person or persons in the community" (Cooley-Quille et al., 1995). Exposure to community violence has been linked to morbidity and mortality, numerous emotional and behavioral problems, and a higher likelihood of becoming a future perpetrator of violence (Bell & Jenkins, 1993). Urban, minority youth appear to bear the highest burden of community violence (Richters & Martinez, 1993). Moreover, African-American youth are more likely to experience chronic community violence in their neighborhoods compared to children of other ethnic backgrounds (Cooley-Strickland et al., 2009). This creates even greater disparities in their developmental opportunities (Hinton-Nelson, Roberts, & Snyder, 1996).

Researchers have used stress theory as a way to understand how exposure to community violence influences children's emotional and behavioral development (Cooley-Strickland et al., 2009; J. Horn & Trickett, 1998). In a stress theory model, community violence is the stressor that is linked to maladaptive outcomes. Past work suggests there is a positive association between community violence exposure and anxiety and internalizing symptoms (Cooley-Strickland et al., 2009; J. Horn & Trickett, 1998; Pynoos et al., 1987). Along with anxiety/internalizing problems, exposure has also been linked to disruptive behavior problems and aggression (Gorman-Smith & Tolan, 1998; Tolan & Henry, 1996). Past work also suggests that community violence exposure can intensify existing externalizing behaviors (Gorman-Smith, Henry, & Tolan, 2004).

The impacts of community violence exposure on academic outcomes has not been studied extensively (Cooley-Strickland et al., 2009). However, the available research suggests

that exposure to community violence increases the risk of poor adaptation to the classroom environment (Cooley-Strickland et al., 2009). Research suggests that school-level factors such as feeling safe in school and school engagement may have protective effects against low achievement but the importance of school level factors for children exposed to community violence is still not well understood (G. Bowen & Rose, 2008; N. Bowen & Bowen, 1999; McCoy, Roy, & Sirkman, 2013; Milam, Furr-Holden, & Leaf, 2010; Ozer & Weinstein, 2004; Ozer, 2005).

Research also indicates that being exposed to community violence may lower a child's cognitive functioning by creating deficits in attention, memory, language skills (Saltzman, 1996). Deficits in cognitive abilities have a direct effect on academic performance. However, given the strong associations between community violence exposure and emotional outcomes, it is not unreasonable to hypothesize that exposures negatively influences non-cognitive skills (i.e. social and emotional classroom competencies) that also contribute to academic success (Kliewer et al., 1998).

Both problem behaviors and social skills are important components of academic success (Kellam, SG, Mayer, Rebok, & Hawkins, 1998; Malecki, Elliott, & Elliot, 2002). In order to be successful, students must demonstrate academic, behavioral, and social competences in the classroom; thus, in order to fully understand the influence of community violence exposure on academic achievement, all three sets of competencies must be taken into consideration.

1.4 The Multiple Opportunities to Reach Excellence Project

The Multiple Opportunities to Reach Excellence (MORE) study was launched to address outstanding questions regarding the prevalence of youth exposure to community

violence and to understand the sequelae that occur across a range of developmental processes including academic achievement (Cooley-Strickland et al., 2009). The MORE Project was designed in such a way that the full impact of children's exposure to community violence on their academic performance, substance use, and emotional and behavioral health could be studied. In addition to its longitudinal design, the study includes multiple levels of data collection; data was collected from children, their caregivers, and teachers.

1.5 Specific Aims

The overall goal of this dissertation is to assess the associations between exposure to community violence and academic achievement using the MORE Project sample. Aim One of this dissertation will assess the joint effects of community violence exposure and the school context on academic achievement. Both the school and neighborhood are important social ecologies that strongly influence early developmental and academic trajectories. However, neither of these ecologies influences the child in isolation. Thus, it is important to understand the relative and joint effects of both of these important predictors on academic achievement. The specific aim is to measure the joint and relative effects of community violence exposure and school-level academic achievement on math proficiency levels using a propensity score weighting approach. Aim Two of this dissertation will examine the associations between patterns of academic, behavioral, and social competences on standardized test performance. Understanding the relationship between academic, behavioral, and social competences and test scores will provide important information to schools and teachers on student skills that can be addressed in the classroom to promote achievement on standardized tests. The specific aim is (1) to develop latent classes of students based academic competences, behavioral problems, and social skills and (2) to test

if the latent classes predict proficiency levels on standardized test scores. Aim Three of this dissertation will examine the association between perceived and objective measures of community violence exposure and children's patterns of academic, behavioral, and social competences. Understanding the mechanism by which violence in a children's neighborhood influences classroom competencies will help inform the appropriate setting for intervention efforts to reduce the impacts of community violence exposure and improve academic outcomes and may help schools identify students who are at high risk of academic failure due to neighborhood conditions. The specific aim is to develop latent classes of students based academic competences, behavioral problems, and social skills and (2) to test if membership in the latent classes is predicted by perceived and objective measures of exposure to community violence.

Chapter 2 reviews the data, methods, and results of the analyses for Aim 1. The data, methods and results for Aim 2 are provided in Chapter 3. Aim 3 is reviewed in Chapter 4 and a final discussion is provided in Chapter 5.

Chapter 2. Estimating the Joint and Relative Effects of School Quality and Violence Exposure on Academic Outcomes

2.1 Abstract

Urban children are disproportionately affected by community violence exposure. While community violence exposure is associated multiple negative outcomes included internalizing and externalizing problems, and aggressive behaviors; the association between community violence exposure and academic outcomes is still not well understood. Moreover, few studies have examined the joint effects of the school environment and community violence exposure. This study used a community based epidemiologically defined sample of urban school children to study the joint and relative effects of community violence exposure and school quality on standardized math test scores. Students were classified into a two by two table with the following categories: high community violence exposure/low performing school, low community violence exposure/low performing school, high community violence exposure/high performing school, and low community violence exposure/high performing school. Propensity score weights were used to balance covariates associated with standardized math and reading achievement test scores so that the distribution of the covariates in the low community violence exposure/low performing school, high community violence exposure/high performing school, and low community violence exposure/high performing school sample matched the covariate distribution in the high community violence exposure/low performing school sample. Logistic regression was used to estimate mean differences in mean basic math proficiency level for each of the three pairwise comparisons. Significant differences in mean basic proficiency levels were found between the high community violence/low performing school vs. high community

violence/high performing school comparison and in the high community violence/low performing school vs. low community violence/high performing school comparison. The mean basic math proficiency levels between the high community violence/low performing school and low community violence/low performing school were not significantly different. The findings of this study suggest that attending a school where a high proportion of students have met math proficiency standards has positive effect on standardized test score for students who experience violence in their communities.

2.1 Introduction

Doing well in school is a key indicator of youth development. The passage of the No Child Left Behind Act (NCLB), has focused local, state, and federal policy towards educational reform with a goal of reducing the achievement gap (*No Child Left Behind (NCLB) Act of 2001*, 2001). Many of the ongoing educational reform policies from NCLB efforts have focused on student, family, and school-level factors that contribute to academic achievement. However, theoretical and empirical research has shown that the neighborhoods in which students live have important influences on educational outcomes (Leventhal & Brooks-Gunn, 2000). The research findings on neighborhood effects have important consequences for reducing the achievement gap (Sandy & Duncan, 2010).

Multiple aspects of the neighborhood environment have been studied with respect to youth development and academic achievement. Children's direct experience with violence in their communities is emerging as an important influence on many developmental outcomes (N. Bowen & Bowen, 1999; Henrich, Schwab-Stone, Fanti, Jones, & Ruchkin, 2004; McCoy et al., 2013; Milam et al., 2010). The past research on children's experience with community violence has consistently demonstrated that a range of developmental, academic, and mental

health problems are common (Cooley-Strickland et al., 2009). These documented outcomes include substance abuse, internalizing symptoms, psychological distress such as anxiety, depression, aggressive behavior, post-traumatic stress disorder; and poor academic achievement (Ainsworth, 2002; Gorman-Smith et al., 2004; Gorman-Smith & Tolan, 1998; Hammack, Richards, Luo, Edlynn, & Roy, 2004; Jain, Buka, Subramanian, & Molnar, 2011). Moreover, exposure to community violence is a highly prevalent risk factor for many urban youth. National estimates suggest that approximately 9.8 million American youth have witnessed some form of violence in their neighborhood (Zinzow et al., 2009). When examined in greater detail, one third of girls and one half of boys in a national sample have witnessed at least one violent act in their neighborhood (Kilpatrick et al., 2003). Even more concerning, these high rates of exposure persist despite a general decline in crime (Stein, Jaycox, Kataoka, Rhodes, & Vestal, 2003).

Urban minority youth appear to bear the highest burden of community violence (Richters & Martinez, 1993). Moreover, African-American youth are more likely to experience chronic community violence in their neighborhoods compared to children of other ethnic backgrounds (Cooley-Strickland et al., 2009). This creates even greater disparities in their developmental opportunities (Hinton-Nelson et al., 1996). Given the persistence of the achievement gap between urban schools and other schools, understanding the impacts of community violence on children's academic achievement is necessary. However, research also indicates that the context in which academic outcomes occur is also important; that is, school factors also have important influences on educational attainment. Thus, there are two concurrent research needs around community violence exposure and academic achievement. The first is to understand the impact of community violence exposure on children's academic performance, and the second is to understand how school

environments may be associated with academic outcomes for children who have been exposed to community violence (Cooley-Strickland et al., 2009).

The theoretical basis for understanding the influences of communities and schools on educational outcomes comes from Bronfenbrenner's bio-ecology theory of development (Bronfenbrenner, 1977). Within the ecological transactional framework, a student's attitudes about school and behaviors in school are the result of the transactional processes between the student and their social contexts that can include the neighborhood, school, peer group, and family. Proximal processes are the systematic interactions between the child and their environment that drive development (Bronfenbrenner, 1977). Proximal processes can be both people (social supports and interpersonal relationships) and places (resources and opportunities for success), but the form and direction of any process systematically varies as a function of the child, the environment, and the outcome being considered. Proximal processes that occur both across and within a child's neighborhood, school, peers, and family all support educational success (Bronfenbrenner, 1977). With the ecological transactional model as a framework, the underlying question of interest in this study is how much does the quality of the school matter for the educational achievement of children who experience violence in their communities? By addressing this question, this study will examine the relative importance of school and community instead of examining their effects separately on academic performance.

Violence Exposure and Academic Achievement

Research on the academic performance of children who have been exposed to community violence is limited (Cooley-Strickland et al., 2009; Saltzman, 1996). Schwab-Stone (1995) found an association between witnessing violence and poor academic

outcomes. Bowen and Bowen (1999) found that middle and high school students who witnessed violence had a higher risk of low school attendance, behavior problems, and failing grades. Finally, a study by Boyd and colleagues (2003) found that community violence exposure was associated with a higher risk of school suspensions and expulsions.

The mechanisms by which community violence impacts academic performance have not been extensively studied (Cooley-Strickland et al., 2009; Schwartz & Gorman, 2003). The current evidence base suggests that depressive and other internalizing symptoms that youth experience in response to community violence lead to a) intrusive thoughts, b) poor concentration, c) low energy, and d) decreased motivation (Schwartz & Gorman, 2003). Disruptive behavior is another hypothesized mediator of community violence and poor academic performance. Schwartz and Gorman (2003) conceptualize this through self-regulation; they suggest that children with decreased levels of self-regulation, as the result of exposure to community violence, are more likely to exhibit aggressive and non-compliant behavior in school. The disruptive behavior limits academic performance. Schwartz and Gorman (2003) found support for this model in a cross-sectional study of elementary students in Los Angeles.

School Effects and Academic Achievement

One of the first studies to examine school influences on academic achievement was the Equality of Educational Opportunity report (also known as the Coleman Report) commissioned by the United States Department of Health, Education, and Welfare in fulfillment of the Civil Rights Act of 1964 (Coleman et al., 1966). The overarching conclusion of the report was that schools had little influence on achievement independent of a child's socioeconomic background and that family, peer, and community influences were

the primary drivers of disparities in educational performance (Coleman et al., 1966). In spite of this early finding, research on the influence of school factors and school resources on student achievement continued. In particular, school socio-demographic characteristics such as school funding, social climate, and school quality and teacher characteristics have all been studied in relation to student achievement.

In a study of college-bound high school students, school size, school poverty, and racial/ethnic composition were associated with self-reported grades; size and racial/ethnic composition had negative correlation with achievement but school poverty had a positive correlation (Everson & Millsap, 2004). Their findings are similar to Caldas & Bankston's (1996) work which showed that school-level minority student composition was negatively associated with standardized test scores but poverty and peer social class status had positive associations with achievement. However, Mayer (1989) found that students attending schools with a high concentration of poverty displayed lower achievement than students from schools with a low concentration of poverty. Similarly, work from Kennedy, Jung, and Orland (1986) found that a high concentration of poverty in schools had a stronger effect on achievement than family level poverty.

Researchers have also studied what role school quality has on achievement. Eamon (2005) found a positive association between perceived school quality and reading and math achievement in a sample of Latino students. In a study of urban youth by Bowen and Bowen (1999), perceived school safety was negatively associated with achievement. Teacher characteristics, which are a facet of school quality, are also associated with achievement. Teacher education, experience, and qualifications have all been found to have a positive association with outcomes; whereas the percent of teachers out-of-field and the percent of new, uncertified teachers have a negative association with achievement (Darling-Hammond,

1991; Greenwald, Hedges, & Laine, 1996). Urban schools are more likely to employ teachers without certifications or advanced degrees, and are also more likely to allow teachers to instruct courses out-of-field (Hannaway, 2005).

2.2 Methods

The Multiple Opportunities for Reaching Excellence Project

The data for this study came from a prospective, community-based epidemiological study of urban school children in Baltimore, MD. The Multiple Opportunities for Reaching Excellence (MORE) Project was a prospective three-year cohort study of the influence of community violence exposure on youth development (Cooley-Strickland et al., 2009). Students were recruited from six elementary schools that came from three different Baltimore neighborhoods that represented low, moderate, and high levels of neighborhood crime. Students were recruited over the course of one and one-half academic years in two cohorts. Recruitment for the first cohort began in January 2007; 427 children were recruited. The second wave of recruitment took place in fall 2007 and included an additional 256 children. The selection criteria for the students included: 1) full time enrollment in one of the six targeted schools in the fall of 2006 or 2007, 2) age between 8-12 years old, and 3) fluency in English and cohabitation with an English-speaking guardian or parent. (3) Race/ethnicity was not used as a selection criterion in order to prevent selection bias and human subjects concerns. Students with a serious medical or neurological illness or that did not live with at least one parent or legal guardian were excluded from the study. There were 1,119 eligible students across both recruitment efforts (participation rate = 67%). Comparison of the demographics of the study sample to school-level means indicate there

were no significant differences between the families who agreed to participate and those who did not (Cooley-Strickland et al., 2009). This study included elementary age students in grades 3-5th grade with available data on community violence exposure and the outcome of interest, Maryland School Assessment reading and math proficiency levels

Measures

To address the research question, this study used propensity score weighting to estimate the relative effects of four different categories of exposure: high exposure to community violence and attending a low-performing school; high exposure to community violence and attending a high-performing school; low exposure to violence and attending a low-performing school, and low exposure to violence and attending a high-performing school. Students in the high community violence exposure condition/low-performing school are the primary exposure category; students in the high community violence exposure/high-performing school sample, community violence exposure/low performing school sample, and low community violence/high-performing school served as comparison groups.

Propensity scores are defined as the conditional probability of treatment given a set of measured covariates (P. Rosenbaum & Rubin, 1983). Propensity scores were calculated for each of the three categories. The propensity scores were then used to weight the high community violence exposure/high-performing school, low community violence exposure/low-performing school sample, and low exposure to violence/high-performing school samples so that their measured covariates matched the target category, the high community violence exposure/low-performing schools condition students. Three pairwise comparisons were made (between the high community violence exposure condition/low-performing schools and high community violence exposure/high-performing school

samples; high community violence exposure condition/low-performing and low community violence exposure condition/low-performing schools; and high community violence/low-performing and low community violence exposure/high-performing school) to estimate the relative and joint effects of community violence exposure and school quality on math proficiency.

Children's Exposure to Community Violence

The Children's Report of Exposure to Violence (Cooley, Turner, & Beidel, 1995) was used to collect data on children's experience with violence in their communities. The Children's Report of Exposure to Violence (CREV) is a self-report questionnaire that assesses children's exposure to community violence; lifetime and past year versions are available. The CREV measures perceived exposure to violence, which may provide a different measure of community violence exposure compared to objective measures of violence, such as police reports (Cooley, Turner, & Beidel, 1995).

The CREV asks children about their experience with a range of violent situations in their neighborhood that includes being chased or threatened, beaten up, robbed or mugged, shot, stabbed, or someone being killed (Cooley et al., 1995). The CREV also distinguishes between strangers and individuals who were familiar to the child. For example, children are asked two questions about someone in their neighborhood being beaten up, "Have you ever seen a stranger being beaten up in your neighborhood?" and "Have you have seen someone you know being beaten up in your neighborhood?"

The original version included 29 items that address violence that occurs in community settings. Following the September 11 terrorist attacks on the United States, the CREV was revised and questions about world violence and perceived exposure to terrorism

were added. The CREV-Revised (CREV-R) includes the original 29 items plus world violence items; there are 45 items on the CREV-R. All of the items on the CREV-R are scored between 0 and 4 (0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day). The Total Score is derived by summing together all of the scores; higher scores indicate high level of community violence exposure. For this study, the past year total score was the primary exposure of interest. In order to define the treatment and control groups, past year total community violence exposure was dichotomized into high vs. low exposure using a median split.

Adequate Yearly Progress

School quality was measured through a proxy measure of school-level academic achievement defined by the school's progress towards meeting Adequate Yearly Progress (AYP). The federal No Child Left Behind Act (NCLB) set a national goal to have all students performing at the proficient level on state standardized tests by the 2013-2014 academic year. Furthermore, both states and schools are accountable for making progress towards this goal; schools that receive Title 1 funds are required to meet "adequate yearly progress" for their total student population as well as specified demographic groups. A school that fails to make AYP for two years in a row is classified as "in need of improvement" and may face potential restructuring by the state (*No Child Left Behind (NCLB) Act of 2001*, 2001).

The purpose of AYP is to ensure that schools and districts continue to make progress towards 100% proficiency in reading and math by 2014. In Maryland, there are 37 targets that schools must meet on an annual basis to demonstrate AYP. For elementary schools, the 37 targets include 18 targets for reading proficiency and participation, 18 for

math proficiency and test participation, and one target for attendance rates (Maryland State Department of Education, n.d.).

For the reading and math proficiency targets, schools must reach a designated percent of students (set by the State) who score at or above the proficient level on the Maryland School Assessment. Additionally, eight subgroups (American Indian students, Asian American students, African American students, Hispanic students, White students, students receiving special education services, students with limited English proficiency, and students receiving free and reduced-price meals) must also reach the designated percent proficient for both math and reading. The proficiency target is the same for each subgroup and increases every academic year. The participation target for testing says that 95% of students must participate in testing and the target for attendance for elementary schools is 94% attendance for all students (Maryland State Department of Education, n.d.).

Data on adequate yearly progress is publically available from the Maryland School Report Card (www.mdreportcard.com). For students in Cohort 1, AYP for the 2006-2007 academic year was used. For students in Cohort 2, AYP for the 2007-2008 academic year was used. In the 2006-2007 academic year, 4 schools (out of 6) had made AYP, and in the 2007-2008 academic year, 3 schools (out of 6) had made AYP.

The students across both cohorts were then classified into a two-by-two table with the following four quadrants: high exposure to violence/AYP not met (HV/LP), high exposure to violence/AYP met (HV/HP), low exposure to violence/AYP not met (LV/LP), low exposure to violence/AYP met (LV/HP).

The primary outcomes of interest are reading and math proficiency measured by the Maryland School Assessment (MSA) math exam. Maryland students take the MSA every year in grades 3-8th and these tests fulfill the federal testing requirements for No Child Left Behind. The reading and math MSA exams test Maryland content standards specified in the State Curriculum for math and reading and are specific to grade level expectations. The MSA math test assesses algebra/patterns, geometry/measurement, statistics/probability, number concepts/computation, and processes of mathematics. The MSA reading test assesses general reading processes, informational text comprehension, and literary text comprehension.

Variables Used in the Propensity Score Estimation Model

Twenty-four covariates were used in the propensity score models. The covariates included demographic measures, parenting practices, neighborhood indicators, and student-level measures of behaviors, attitudes, risk factors, and mental health symptoms. These covariates were selected based on past research that indicates that they are associated with educational attainment (G. Bowen & Rose, 2008; N. Bowen & Bowen, 1999; Milam et al., 2010). Table 2 provides descriptive statistics of the covariates for the study sample. A description of the variables used to estimate the propensity scores is provided in Appendix A. Missing values on the 24 covariates ranged from 1% to 42%; parent-reported measures of parenting practices had the highest percent of missing data. Single mean imputation was used to impute the missing values in the covariates, and missing data indicators were included in the propensity score model (Stuart, 2010). This approach is generally not

considered an appropriate way to handle missing data; however, it is an acceptable approach in the propensity score process. Including the imputed values and the missing data indicator produces balance on the observed covariate values and the missing data patterns (Stuart, 2010).

Statistical Analysis

Students in the high community violence exposure/low-performing school sample have the highest risk of academic failure based on theory and past research and are therefore the primary exposure group of interest. To estimate the potential gains from going from high community violence exposure to low community violence exposure and going from a low-performing school to a high-performing school, three separate comparisons will be made: mean difference in outcomes between HV/LP and HV/HP students, mean difference in outcomes between HV/LP and LV/HP students, and mean differences in outcome between HV/LP and LV/HP students.

As students across the three categories differ in a range of confounding variables that are related to the outcome of interest, propensity score weights were used to adjust for observed differences among the students in the three categories. Propensity score weights were used to re-weight each of the three comparison conditions, HV/HP, LV/LP and LV/HP, to match the high community violence exposure/AYP not met group (HV/LP) with respect to the 24 covariates included in the propensity score model. Under this weighting approach the outcome model will compare mean basic math and reading proficiency levels the HV/LP students experienced and the mean basic math and reading proficiency levels the HV/LP students would have achieved had they been in the HV/HP,

the LV/LP, or the LV/HP groups. Since the outcomes are not used in the model to estimate the propensity scores, the same set of propensity score weights can be used for multiple outcomes.

Propensity Score Estimation and Balance

The propensity scores were estimated using Imai and Ratkovic's (2014) covariate balancing propensity score approach which can be implemented in the R package of the same name. The CBPS formally combines the dual properties of the propensity score as the conditional probability of treatment assignment and a covariate balancing score to optimize balance between the treatment and control groups. The estimation procedure uses the covariate balancing condition (i.e., mean independence between the treatment and covariates after weighting) and first order moment conditions from the propensity score likelihood function. Generalized method of moments is used to jointly estimate this system of equations. CBPS is able to achieve optimal balance through a trade-off in the accuracy of the prediction of treatment assignment (Imai & Ratkovic, 2014).

For this study, the “estimand” of interest is the Average Treatment Effect on the Treated (ATT), which provides a comparison of the weighted mean outcomes between the treatment group (HV/LP) and the control group that has been weighted to match the treatment group on a set of covariates. Students in the treatment group have a weight of 1 and comparison group students have weights equal to the ratio of the propensity score to one minus the propensity score (i.e., weighting by the odds). By using this weighting approach, both the primary exposure group and the comparison groups are weighted to match the covariate distributions of the primary exposure group. Because the goal is to ensure that the covariate distribution for each comparison group matches the covariate

distribution for the primary exposure group, a unique propensity score estimation model is needed for each pairwise comparison (McCaffrey et al., 2013). Along with checking covariate balance, it is necessary to check if there is sufficient overlap in the estimated propensity scores between the comparison groups. Overlap in the propensity scores implies that each student in the primary exposure group (HV/LP) could have been one of the other comparison groups and that none of the covariates have values that occur in one exposure category. The most common method to check for overlap is through graphical methods such as box plots comparing the distributions of propensity scores for each pairwise comparison (McCaffrey et al., 2013; Stuart, 2010).

Sufficient balance must be achieved following propensity score adjustment before analysis proceeds to the outcome model. Balance between the treatment and control groups implies that the distribution of the covariates is similar between the treatment and comparison groups. The standardized bias is the primary tool used to assess the similarity between the weighted groups. For a particular covariate, the standardized bias is the weighted mean difference divided by the standard deviation in the original full sample (Rubin, 2001). Based on the recommendations of Ho et al. (2007) a standardized bias less than 0.20 was the threshold used to determine if propensity score weighting achieved sufficient balance.

The ATT for LV/LP students relative to HV/LP students represents the mean basic math (or reading) proficiency levels HV/LP students would have experienced had they been in the LV/LP category (i.e. the effect on math proficiency had their exposure to violence been lower). The ATT will be estimated by sub-setting the data set to just students in the LV/LP and HV/LP groups and estimating the weighted mean level of basic math (or reading) proficiency for the HV/LP students, which is equal to the un-weighted mean level

of basic math proficiency in the HV/LP category. The mean level of basic proficiency HV/LP students would have had if they had been in the LV/LP category is estimated by the ATT weighted mean level of basic proficiency for the LV/LP sample. The coefficient for the HV/LP indicator variable is the estimated ATT. This process will be then be repeated for the HV/HP and the LV/HP samples.

The final set of outcome models used logistic regression to model basic proficiency status (Basic =1, Proficient/Advanced = 0). Odds ratios and average probability of basic proficiency status for each of the three pairwise comparisons for both outcomes were reported. For each outcome (reading and math proficiency) two models were fit: (1) a model with only treatment group indicators, and (2) a “doubly robust” model with included treatment group indicators and covariates with a standardized bias greater than 0.2 to control for residual confounding; results from the second set of models are presented¹. Outcome models were run using Stata’s survey commands (StataCorp, 2013) to incorporate the propensity score weights and to account for the clustering within schools.

2.3 Results

Description of Exposure Categories

The HV/HP, LV/LP, LV/HP comparison samples were weighted to match the characteristics of the students in the high violence exposure/low performing school group (HV/LP). Table 1 provides the un-weighted means of the study population for the covariates in the propensity score model. There were 140 students in the HV/LP sample;

¹ The imputed values created from the single mean imputation process and used for the propensity score model estimation were not used in the outcome models. The six variables that were used across the outcome models did have missing values in the full sample before imputation.

they were an average of 9.8 years old, 53% were boys, 86% were black, 14% received special education services, and 74% participated in the free and reduced lunch program. Students in the LV/LP sample were an average of 9.1 years old, 39% were boys, 80% were black, 16% were receiving special education services, and 84% participated in the free and reduced lunch program. There were 141 students in the LV/LP sample. Students in the HV/HP sample had an average age 9.7, 51% were boys, 86% were black, 14% were receiving special education services, and 93% participated in the free and reduced lunch program. There were 199 students in the HV/HP category. There were 161 students in the LV/HP sample; they were an average of 9.4 years old, 40% were boys, 84% were black, 17% received special education services, and 87% participated in the free and reduced lunch program.

Prior to weighting, students in the LV/LP sample were younger than HV/LP students. Students in the LV/LP category also reported less trouble with their peers, family, and school. LV/LP also had lower levels of economic distress and anxiety/depression symptoms. They also had less access to drugs. The percentage of girls was higher in the LV/LP sample as well.

More students in the HV/HP category participated in the free and reduced lunch services than HV/LP students prior to weighting. Students in the HV/HP category also had higher attendance rates. Students in the HV/HP category were more likely to feel safe in their school. However, students in the HV/HP category lived on street blocks with higher levels of disorder and had more exposure to drugs.

Prior to weighting, students in the LV/HP sample were younger than HV/LP students. The LV/HP sample had a higher attendance rate and LV/HP students were more likely to participate in the free and reduced lunch program. The LV/HP sample also reported a higher level of school engagement. Students in the LV/HP category reported less

trouble with their peers, family, and school. The LV/LP sample also had lower levels of economic distress and anxiety/depression symptoms. They also had access to drugs but lived on street blocks with higher levels of disorder. The percentage of girls was higher in the LV/LP sample as well.

Table 1. Un-Weighted Means

	High Violence Low- Performing N = 140	Low Violence Low- Performing N = 141	High Violence High- Performing N = 199	Low Violence High- Performing N = 161
Demographics				
Age	9.78	9.07	9.64	9.40
% Boys	0.53	0.39	0.51	0.40
% Black	0.86	0.80	0.86	0.84
% Special Education Services	0.14	0.16	0.14	0.17
% Free and Reduced Lunch Services	0.74	0.84	0.93	0.87
% 3rd Grade	0.31	0.57	0.38	0.50
% 4th Grade	0.29	0.30	0.28	0.27
% 5th Grade	0.40	0.13	0.35	0.23
Attendance	94.89	94.53	96.52	96.64
SSRS Social Skills Scale	99.29	101.52	95.08	98.52
SSRS Problem Behaviors Scale	105.13	103.98	106.63	104.18
SSRS Academic Competence	29.81	30.23	29.36	28.32
School Engagement	12.39	12.63	12.88	12.90
MESA Peer Hassles	3.88	2.23	3.62	2.14
MESA School Hassles	1.65	1.20	1.72	1.19
MESA Family Conflicts	1.45	0.94	1.52	1.01
MESA Family Trouble	4.56	3.37	5.03	3.71
MESA Economic stress	1.79	0.95	1.79	1.17
YSR Anxious-Depressed subscale	54.79	52.60	55.07	52.99
YSR Withdrawn subscale	55.89	54.82	56.73	55.38
Neighborhood Disorder	0.47	0.51	0.73	0.68
Exposure to Drugs	0.49	0.25	0.59	0.28
Feel Safe in School	0.66	0.75	0.74	0.73
Feel Safe in Neighborhood	0.70	0.72	0.62	0.72
PPS Discipline	11.19	11.07	11.37	11.29
PPS Involvement	43.4	43.2	43.5	43.1

Table 2 provides the weighted means for the four comparison groups. Overall, weighting appears to have been successful in achieving balance between each of the three pairwise comparisons.

Table 2. Weighted Means

	High Violence Low Performing	Low Violence Low Performing	High Violence High Performing	Low Violence High Performing
Demographics				
Age	9.78	9.65	9.89	9.53
% Boys	0.53	0.38	0.54	0.51
% Black	0.86	0.82	0.80	0.82
% Special Education Services	0.14	0.17	0.15	0.19
% Free and Reduced Lunch Services	0.74	0.70	0.76	0.76
% 3rd Grade	0.31	0.31	0.32	0.40
% 4th Grade	0.29	0.36	0.24	0.33
% 5th Grade	0.40	0.34	0.45	0.27
Attendance	94.89	95.30	95.46	95.80
SSRS Social Skills Scale	99.29	101.41	99.84	97.06
SSRS Problem Behaviors Scale	105.13	104.29	104.98	106.11
SSRS Academic Competence	29.81	28.84	30.90	29.34
School Engagement	12.39	12.13	12.36	12.19
MESA Peer Hassles	3.88	3.65	3.88	3.88
MESA School Hassles	1.65	1.60	1.60	1.64
MESA Family Conflicts	1.45	1.27	1.54	1.25
MESA Family Trouble	4.56	4.36	4.71	4.31
MESA Economic stress	1.79	1.71	1.96	1.75
YSR Anxious-Depressed subscale	54.79	53.37	54.64	54.59
YSR Withdrawn subscale	55.89	55.81	56.21	56.37
Neighborhood Disorder	0.47	0.47	0.47	0.45
Exposure to Drugs	0.49	0.51	0.45	0.46
Feel Safe in School	0.66	0.61	0.66	0.64
Feel Safe in Neighborhood	0.70	0.67	0.71	0.71
PPS Discipline	11.19	11.52	11.32	11.36
PPS Involvement	43.38	42.68	43.42	43.13

Table 3 provides the standardized biases for the propensity score weighted means for the HV/LP, HV/HP, and LV/HP samples; for all three sets of standardized biases are to the HV/HP category is the reference category. For the LV/LP category, all but two of the standardized biases were below 0.2. The standardized bias for was gender 0.30, and the

standardized bias for anxiety/depression symptoms was 0.25; both of these variables will be controlled for when estimating the association between category and math proficiency². In the HV/HP sample all of the weighted standardized biases were below 0.2. For the LV/HP all but two of the standardized biased were below 0.2. The standardized bias for age was 0.22, and the standardized bias for 5th grade was 0.26. Both variables will be controlled for when estimating the association between category and math proficiency³. Figures 1, 2, and 3 present Love plots of thee standardized biases for 24 covariates before and after propensity score weighting for the three comparisons (Aronow, Ahmed, Ekundayo, Allman, & Ahmed, 2009). Figure 4, 5, and 6 are histograms comparing the overlap between the distribution of the propensity scores between the HV/LP and LV/LP samples, the HV/LP and HV/HP samples, and the HV/LP and LV/HP samples respectively. All three histograms indicate that there is sufficient overlap to proceed with the pairwise comparisons. For all three propensity score models, the upper and lower tails of the distribution of the propensity scores did not overlap. As a sensitivity check, for each of the three pairwise comparisons, the covariate-adjusted outcome models were rerun and restricted to students whose estimated propensity score was in the common range of the estimated propensity scores. The magnitude and significance level for all six of the estimands did not change appreciably, so the estimates using all available data points are presented below.

Estimated Differences in Mean Proficiency Levels

Logistic regression that incorporated the propensity score weights and accounted for student clustering in schools was used to model basic math reading proficiency status; a

² Gender and the YSR anxiety/depression scale did not have any missing values in the original sample before imputation.

³ Age and grade did not have any missing values in the original sample before imputation.

separate model was estimated for each pairwise comparison (McCaffrey et al., 2013). As can be seen from the results in Table 4, there were no significant differences between the HV/LP sample and the LV/LP sample weighted to match the HV/LP sample in basic math proficiency status (Coef. = 0.3, SE: 0.39) after weighting and controlling for unbalanced covariates. The mean basic math proficiency level in the HV/LP sample was 0.39 (SE: 0.04), and the estimated mean basic math proficiency HV/LP students would have experienced if their violence exposure were below the sample median was 0.33 (SE: 0.11).

There was also not a significant difference in mean basic reading proficiency levels (Coef. = -0.34, SE: 0.12) between the HV/LP sample and the LV/LP sample weighted to match the HV/LP sample. The mean basic reading proficiency level in the HV/LP sample was 0.31 (SE: 0.03), and the estimated mean basic reading proficiency HV/LP students would have experienced if their violence exposure were below the sample median was 0.38 (SE: 0.04).

Table 3. Weighted Standardized Biases

	Low Violence Low-Performing	High Violence High-Performing	Low Violence High-Performing
Age	0.12	-0.10	0.22
% Boys	0.30	-0.03	0.04
% Black	0.10	0.16	0.11
% Special Education Services	-0.09	-0.05	-0.15
% Free and Reduced Lunch Services	0.11	-0.03	-0.04
% 3rd Grade	0.02	-0.01	-0.18
% 4th Grade	-0.16	0.11	-0.10
% 5th Grade	0.13	-0.09	0.26
Attendance	-0.08	-0.11	-0.18
SSRS Social Skills Scale	-0.12	-0.03	0.12
SSRS Problem Behaviors Scale	0.05	0.01	-0.06
SSRS Academic Competence	0.10	-0.11	0.05
School Engagement	0.14	0.01	0.11
MESA Peer Hassles	0.10	0.00	0.00
MESA School Hassles	0.04	0.04	0.01
MESA Family Conflicts	0.12	-0.06	0.13
MESA Family Trouble	0.08	-0.06	0.10
MESA Economic stress	0.05	-0.09	0.02
YSR Anxious-Depressed subscale	0.25	0.03	0.04
YSR Withdrawn subscale	0.01	-0.05	-0.07
Neighborhood Disorder	-0.02	0.00	0.05
Exposure to Drugs	-0.05	0.08	0.06
Feel Safe in School	0.09	0.00	0.03
Feel Safe in Neighborhood	0.07	-0.03	-0.03
PPS Discipline	-0.08	-0.03	-0.04
PPS Involvement	0.13	-0.01	0.05

There was a significant difference between the HV/LP sample and HV/HP sample weighted to match the HV/LP sample in basic math proficiency status (Coef. = 1.41, SE: 0.38) after weighting. The mean basic math proficiency level for the HV/LP sample was 0.39 (SE: 0.04), and the estimated mean basic math proficiency HV/HP students would have experienced if their school made Adequate Yearly Progress was 0.14 (SE: 0.04). The result indicates that the percent of the HV/LP students achieving a proficient or advanced score on the MSA math test would increase from 61% to 86% had the HV/LP students attended a high performing school.

However, there was not a significant difference between the HV/LP sample and HV/HP sample weighted to match the HV/LP sample in basic reading proficiency status (Coef. = 0.70, SE: 0.48) after weighting. The mean basic reading proficiency level for the

HV/LP sample was 0.31 (SE: 0.03), and the estimated mean basic reading proficiency HV/HP students would have experienced if their school made Adequate Yearly Progress was 0.18 (SE: 0.08).

Table 4. Estimated relative effects on basic math proficiency

Contrast	Estimate	SE	P-Value
HV/LP vs. LV/LP	0.30	0.39	0.52
HV/LP vs. HV/HP	1.41	0.38	0.01
HV/LP vs. LV/HP	1.37	0.25	0.00

Table 5. Estimated relative effects on basic reading proficiency

Contrast	Estimate	SE	P-Value
HV/LP vs. LV/LP	-0.34	0.12	0.17
HV/LP vs. HV/HP	0.70	0.48	0.20
HV/LP vs. LV/HP	1.27	0.40	0.03

There was a significant difference between the HV/LP sample and the LV/HP sample weighted to match the HV/LP sample in basic math proficiency status (Coef. = 1.37, SE: 0.25) after weighting and controlling for unbalanced covariates. The mean basic math proficiency level in the HV/LP sample was 0.39 (SE: 0.04), and the estimated mean basic math proficiency HV/LP students would have experienced if their violence exposure were below the sample median and their school made Adequate Yearly Progress was 0.15 (SE: 0.03). This indicates that the percent of the HV/LP students achieving a proficient or advanced score on the MSA math test would increase from 61% to 85% had the HV/LP students had a lower exposure to violence and attended a school that had made Adequate Yearly Progress.

There was also a significant difference between the HV/LP sample and the LV/HP sample weighted to match the HV/LP sample in basic reading proficiency status (Coef. = 1.27, SE: 0.40) after weighting and controlling for unbalanced covariates. The mean basic reading proficiency level in the HV/LP sample was 0.31 (SE: 0.03), and the estimated mean

basic reading proficiency HV/LP students would have experienced if their violence exposure were below the sample median and their school made Adequate Yearly Progress was 0.11 (SE: 0.05), indicating the percent of students in the HV/LP sample achieving a proficient or advanced score on the MSA reading exam would increase from 69% to 87%.

Table 6. Estimated Differences in Basic Math Proficiency

High Violence Low Performing	Low Violence Low Performing	High Violence High Performing	Low Violence High Performing	Difference
0.39	0.33			0.07
0.39		0.14		0.26*
0.39			0.15	0.24*

*Indicates a significant difference

Table 7. Estimated Differences in Basic Reading Proficiency

High Violence Low Performing	Low Violence Low Performing	High Violence High Performing	Low Violence High Performing	Difference
0.31	0.38			-0.07
0.31		0.18		0.13
0.31			0.13	0.19*

*Indicates a significant difference

2.4 Discussion

Using a community-based sample of urban, elementary school students, this study examined the relative effects of community violence exposure and school context on academic achievement. Both factors have the potential to be important influences on educational attainment but relatively few studies have studied their joint effects (W. Bowen, Chingos, & McPerson, 2009; McCoy et al., 2013; Owens, 2010)

Propensity score weights were used to control for confounders of academic achievement. The advantage of using propensity scores for this analysis is that they made it possible to estimate unbiased relative effects of high vs. low community violence and attending a high-performing vs. low-performing school, assuming there were no unmeasured confounders. For math proficiency, the findings from these three pairwise comparisons suggest that for students attending a low-performing school, the relative effect of high exposure to violence in their community did not significantly lower their performance on the MSA math exam, whereas for students who experienced high levels of violence in their communities, attending a high-performing school had a positive impact on their academic performance. A different pattern was observed for reading proficiency levels; significant improvements were only seen in the comparison between the HV/LP and LV/HP samples.

Given the significant associations observed in the mean math proficiency levels, the findings from the three pairwise comparisons of mean reading proficiency levels were surprising. However, there was a much larger disparity between the HV/LP sample and the HV/HP, LV/LP, and LV/HP samples in math proficiency levels than in reading proficiency levels, which may account for the differences in estimated patterns of mean math and reading proficiency. Only 60% of the HV/LP students achieved proficient or advanced scores on the MSA math exam, whereas 70% of the HV/LP students had proficient or advanced scores on the MSA reading exam. Averaged across the HV/HP, LV/LP, and LV/HP samples, 76% of the students achieved proficient or advanced scores on the MSA math exam and 75% achieved proficient or advanced scores on the MSA reading exam.

These findings should be interpreted in light of the broader research on neighborhood and school effects. The available research on neighborhood effects on education outcomes suggests that living in an advantaged neighborhood has positive effects on school outcomes (Ainsworth, 2002; Catsambis & Beveridge, 2001; Eamon, 2002, 2005; Leventhal & Brooks-Gunn, 2000; Teitler & Weiss, 2000; Whipple, Evans, Barry, & Maxwell, 2010). For example, both absolute poverty and relative neighborhood poverty levels compared to school peer's neighborhood poverty levels appear to have a strong association with achievement (Brooks-Gunn & Duncan, 1997; Leventhal & Brooks-Gunn, 2000; Owens, 2010). Given the relatively strong associations that have been found between neighborhood environment and achievement, the relatively small effects of violence exposure are somewhat surprising. However, while neighborhood crime is one aspect of overall neighborhood quality, this study was specifically interested in the effects of a child's direct experience with violence in their community. Nearly 40% of the students included in this study lived in a low violence neighborhood but reported high levels of exposure to community violence, which suggests that neighborhood levels of social disorder and crime and direct exposure to community violence should be considered as separate influences on youth outcomes.

An analysis of the full five-city Moving to Opportunity Study (MTO) study sample found that reading and math test scores did not significantly improve for students from families offered vouchers (Sanbonmatsu, Kling, Duncan, & Brooks-Gunn, 2006). The authors hypothesize this finding may, in part, be explained by the fact that moving to more affluent neighborhoods did not consistently result in a transfer to a higher quality school (Sanbonmatsu et al., 2006). This hypothesis is consistent with the findings from this study, namely that which school a child attends has significant influences on achievement.

Moreover, this study suggests that district-level efforts that focus on average school proficiency levels can have positive effects on individual student performance, even for students who are at high risk of low performance due to community risk factors.

These findings suggest that the effect of community violence exposure on elementary school children's academic achievement is small in elementary school. This result was surprising given that the available research suggests this is not the case (Borofsky, Kellerman, Baucom, Oliver, & Margolin, 2013; N. Bowen & Bowen, 1999; Cooley-Strickland et al., 2009; Henrich et al., 2004; McCoy et al., 2013; Milam et al., 2010; Ozer & Weinstein, 2004). However, students in this sample were all in elementary school, and older age is a known risk factor exposure to community violence (Richters & Martinez, 1993). It may be the case that association between community violence exposure and academic exposure increases with higher levels of exposure that occurs as children get older.

Since this study only included elementary-aged children, the effects of community violence exposure may become more important in middle and high school students. However, there is evidence that early academic problems in elementary school increase the risk of academic disengagement in adolescence and the risk for social, emotional, and behavioral problems over time (Balfanz, Herzog, & Mac Iver, 2007; Caspi, Wright, Moffitt, & Silva, 1998; Masten et al., 2005). Given how prevalent community violence exposure is, particularly for urban children, recognizing and understanding the impacts community violence has on children's long-term academic success is important from a public health perspective. Additionally, past research has shown that aggressive behavior, depressive symptoms, and deviant peer affiliations increase the risk of community violence exposure and that these risk factors are also associated with poor educational outcomes (Boyd et al., 2003; Gorman-Smith & Tolan, 1998; Lambert, Bettencourt, Bradshaw, & Ialongo, 2013;

Lambert, Ialongo, Boyd, & Cooley, 2005). Thus, the association between community violence exposure and academic achievement may be best understood as part of a process in which a child accumulates multiple risk factors over time.

Strengths and Limitations

There are several strengths and limitations that should be discussed before final conclusions about the findings can be made. First, a primary strength of this study is that the analysis examined the relative effects of community violence exposure and school characteristics (meeting AYP) on academic outcomes. The ecological theory suggests that a child's nested social ecologies are not static, and the transactional processes across multiple nested ecologies are important drivers of youth development. Thus, assessing the effects of one social context (i.e. neighborhood) without accounting for the other influence of other social ecologies (i.e. school) may over or underestimate the estimate of interest. An additional strength of this study is that it used propensity score weighing to adjust for individual, peer, family, and neighborhood differences between groups. The advantage of using propensity scores is that it reduces bias in the estimated relative effects of violence exposure and school effects. The advantage of propensity score weighting is that this method uses all of the available data points in the outcome model unlike other propensity score methods such as matching, where treatment units may be discarded if they cannot be matched to a control subject.

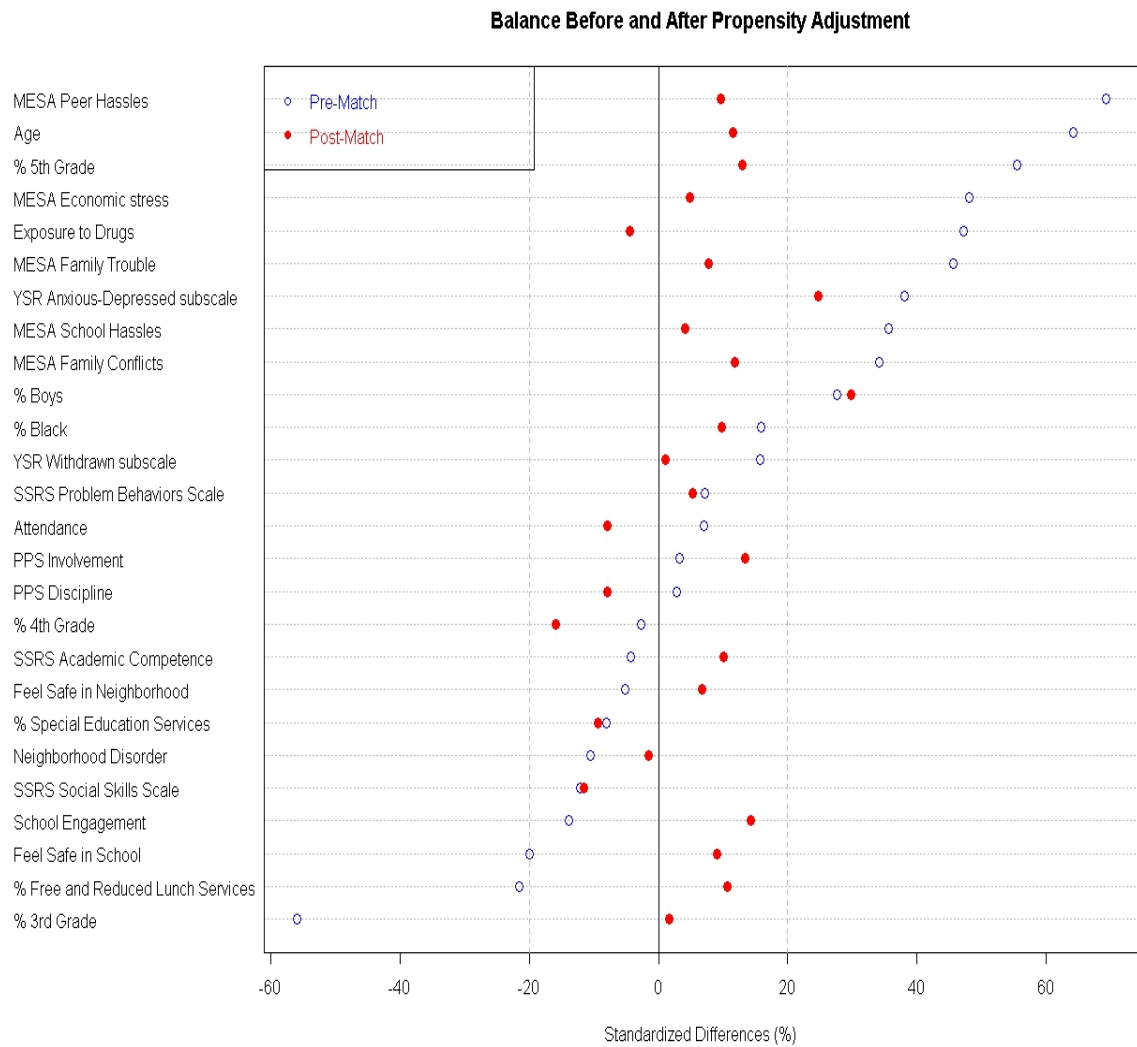
However, a limitation of non-experimental studies such as the one presented here is that propensity scores only control for bias from measured covariates (as would be the case for standard regression adjustment as well). It is likely there are unobserved student, school, family and neighborhood characteristics that may account, at least in part, for some of the

observed relationships between math proficiency levels and the three categories. To the extent possible, based on the available data from the MORE Project, covariates from multiple domains that have been found to have significant associations with academic achievement were included. However, data on classroom-level variables such as student-to-teacher ratios and classroom climate, both associated with student level achievement, were not available in the MORE Project (Mosteller, 1995). Finally, the propensity scores appeared to create sufficient balance for each of the comparisons but only cross-sectional data was used in this study so the findings should be interpreted as associations rather than effects. Future studies should examine the persistence of school and community violence exposure associations with student outcomes over time.

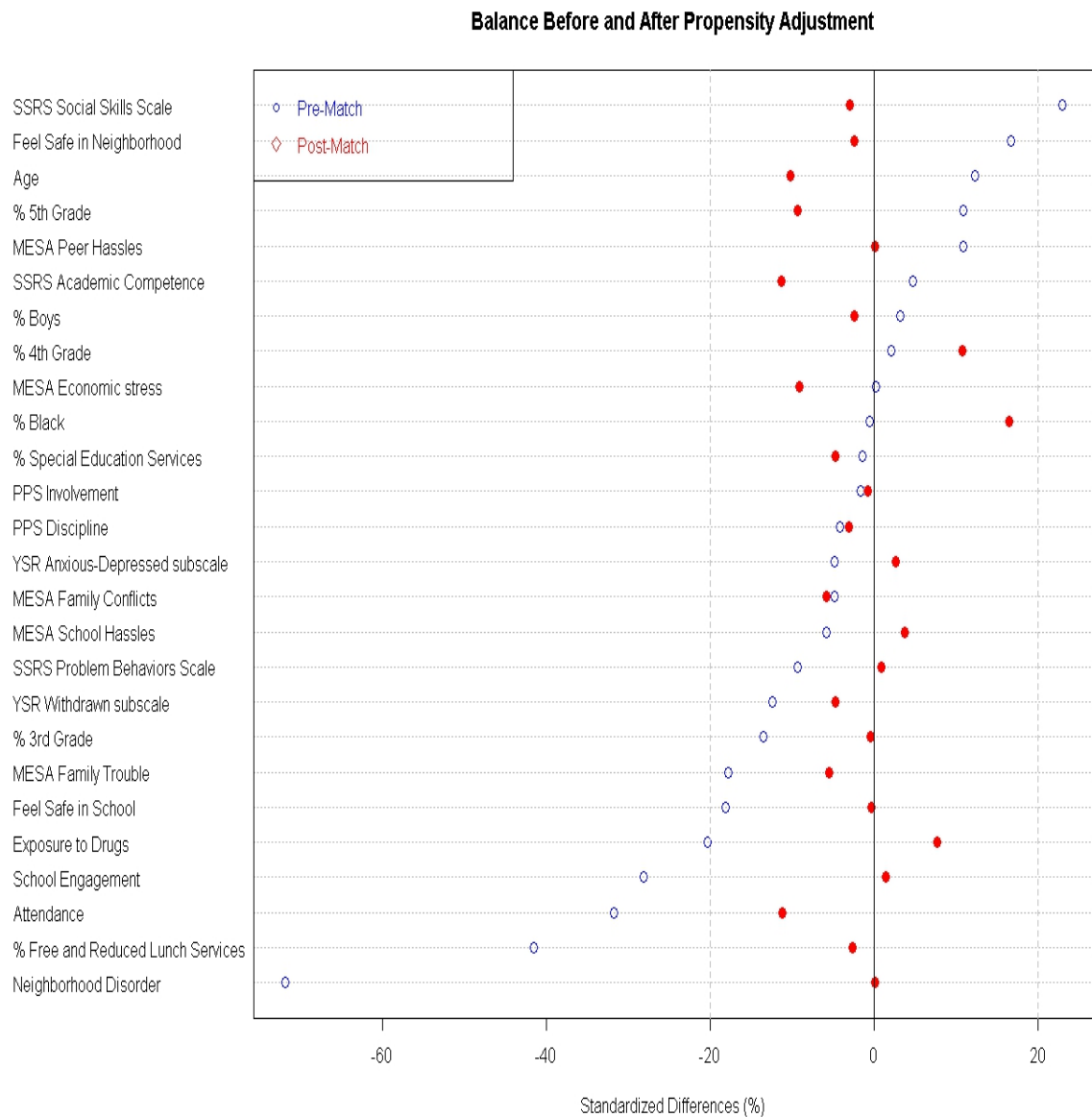
An additional limitation comes from the measures used to operationalize school quality and academic achievement. Proficiency status on the math and reading Maryland School Assessment (MSA) were used to measure academic performance. There is some evidence that student grades are a better measure of academic performance, as they reflect both cognitive and non-cognitive skills (C. A. Farrington et al., 2012; Jacob, 2001; Roderick, Nagaoka, & Allensworth, 2008). However, one benefit of using MSA math test scores, particularly in this study, is that there are consistent standards for defining proficiency regardless of which school a child attended. Additionally, Adequate Yearly Progress was used as a binary measure of school quality. Adequate Yearly Progress primarily reflects school-level performance on standardized tests and is likely not reflective of school-level characteristics such as school climate and operational management, which may be important for overall school-level success. Moreover, the utility of Adequate Yearly Progress as a school-level metric is still debated (see for example, (Kim & Sunderman, 2005). However, a school's AYP status determines important policy decisions on funding, school restructuring

and closings, and intervention from the state. Therefore, despite its limitations as a measure, it has important practical implications for schools, and, again, is consistently applied across schools.

Figure 1. High Violence/Poor School vs. Low Violence/Poor School Pairwise Comparison



**Figure 2. High Violence/Poor School vs. High Violence/High Performing School
Pairwise Comparison**



**Figure 3. High Violence/Poor School vs. Low Violence/High Performing School
Pairwise Comparison**

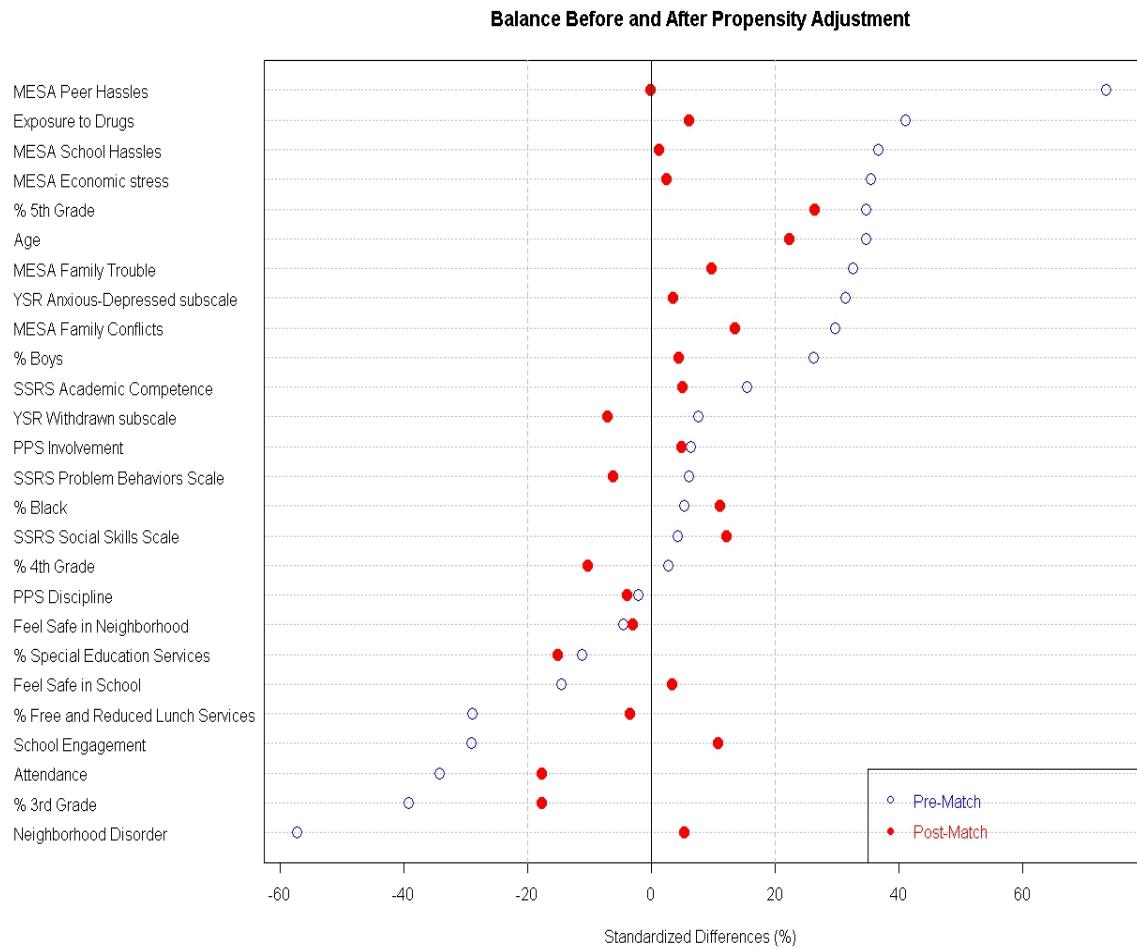


Figure 4. Propensity Score Overlap, HV/PS vs LV/PS Comparison

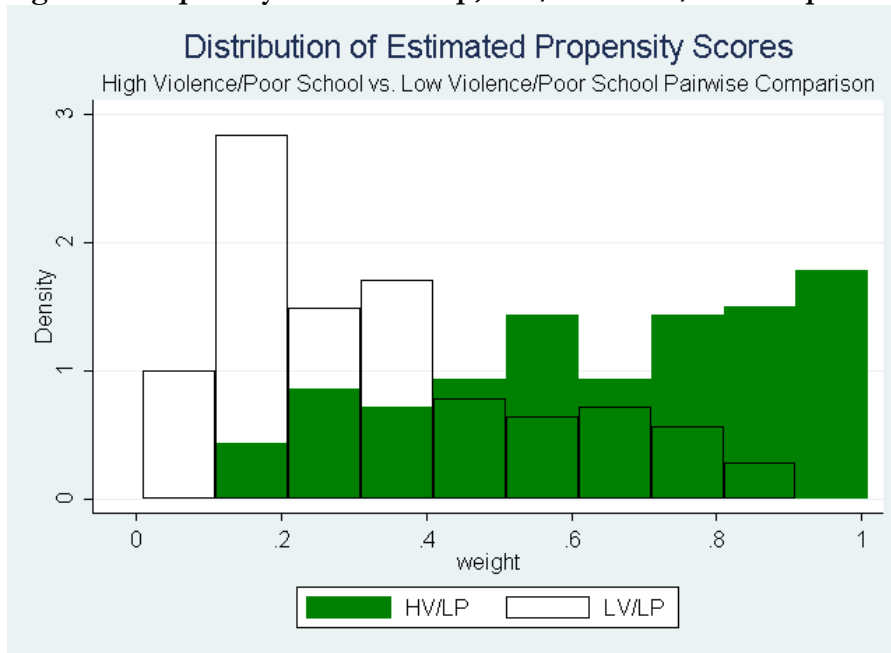


Figure 5. Propensity Score Overlap, HV/PS vs HV/GS Comparison

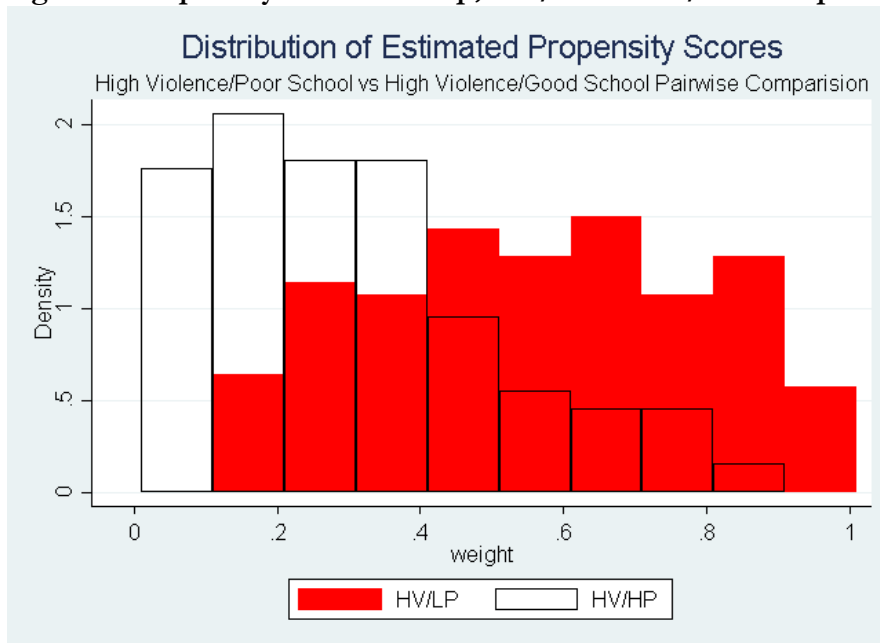
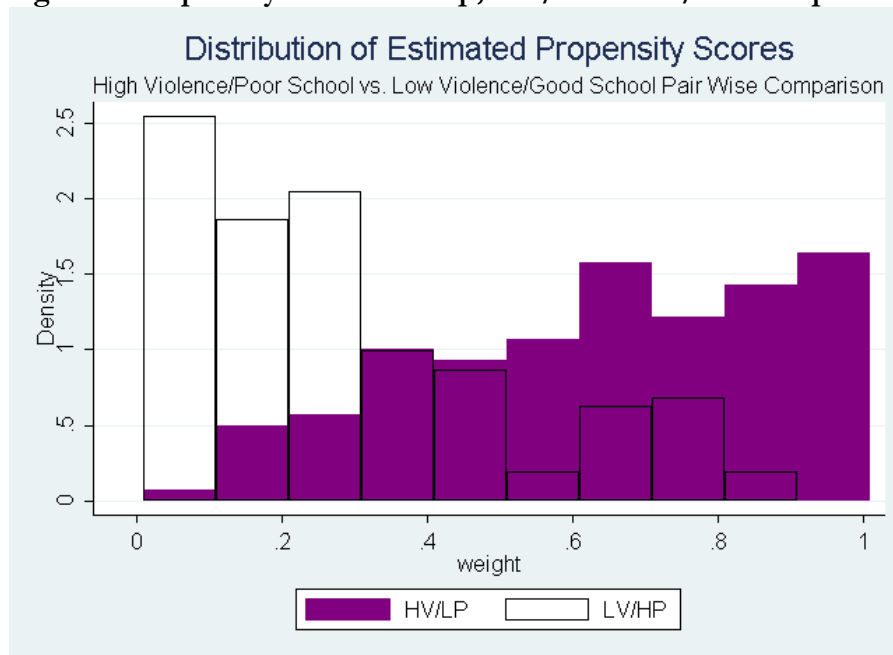


Figure 6. Propensity Score Overlap, HV/PS vs LV/GS Comparison



Chapter 3. The Association between Latent Classes of Academic, Social, Behavioral Competencies and Standardized Test Performance

3.1 Abstract

This study used latent class analysis to identify different patterns of academic, social, and behavioral competencies in elementary-aged school children. Separate analyses were conducted for boys and girls. For the girls the identified classes included a class with high competencies across all three domains, a class characterized by poor social skills and moderate academic problems, and class characterized by internalizing and academic problems. For the boys, the identified classes included a class with high competences, a class characterized by disruptive behavior and academic problems, and a class characterized by poor social skills and academic problems. For both boys and girls, the classes characterized by high competencies across all three domains consistently performed better on both reading and math standardized tests. The classes characterized by multiples problems across the three domains did not have significantly different test scores from each other. These findings indicate that children with the highest risk of academic failure may demonstrate social and behavioral deficits in addition to academic problems. Intervention efforts may need to address the multiple domains of academic, social, and behavioral competencies in order to reduce the risk of academic failure.

3.2 Introduction

From a life course perspective, successfully adapting to and succeeding in school is a key developmental task that children face (Kellam & Rebok, 1992; Kellam et al., 1998). School success is a complex process that is influenced by both intrinsic student factors and the student's external environment. Poor academic performance, especially in elementary

school, is associated with a range of negative outcomes including mental health problems such as depression and anxiety, delinquency, violence, and substance abuse. (C. A. Farrington et al., 2012; Herman, Lambert, Ialongo, & Ostrander, 2007; Horn, O'Donnell, & Vitulano, 1983; Huntington & Bender, 1993; Spren, 1988).

Researchers and educators have long acknowledged that intrinsic student factors contributing to academic success include academic skills or cognitive ability and a set of attitudes, behaviors, and strategies that are often not captured in cognitive tests (Bransford, Brown, & Cocking, 2000; C. A. Farrington et al., 2012). Farrington and colleagues describe these non-cognitive factors as a set of “academic behaviors” that contribute to academic success. These academic behaviors include “behaviors, skills, attitudes, and strategies that are crucial to academic performance” that reflect how well the student is able to interact with teachers and peers in their school environment (C. A. Farrington et al., 2012, p. 2).

Social and emotional skills refer to a child's ability to adjust their thoughts and emotions in response to environmental demands (Blair, 2002). These skills are reflected in the child's behavior across different social contexts; in the classroom these skills are reflected in problem behaviors (e.g. internalizing, externalizing, and hyperactivity problems) and social skills that include interacting with teachers and peers and the ability to successfully adapt to classroom expectations (Kellam et al., 2008; Ladd, Herald, & Kochel, 2006). Social skills include behaviors that improve interactions with other students and teachers, such as cooperation, assertion, empathy, and self-control (Malecki, Elliott, & Elliot, 2002). The theory behind the link between classroom social skills and academic performance is that good social skills increase opportunities for social interactions in the classroom that promote learning (Bandura, 1977; Vygotsky, 1978). For example, work by Slavin (1995) suggests that there is a positive association between cooperative learning and academic success. In a

longitudinal study, Teo, Carlons, Mathieu, Egeland & Sroufe (1996) found that social and emotional learning was predictive of high academic performance at 1st, 3rd, and 6th grade. Research by Wentzel (1991, 1993) found positive associations between pro-social behavior and standardized test scores and grades while controlling for student IQ; she suggests that pro-social behavior contributes to academic success by supporting an environment in which a student's social and academic goals align. Current research supports the theory that social skills contribute to performance as "academic enablers" in that they promote learning by supporting classroom engagement and minimizing classroom disruptions (Malecki et al., 2002).

Some research also suggests that the association between social and emotional skills and academic achievement is stronger in elementary school than in middle and high school. In the Baltimore Beginning School Study, researchers found that immaturity and trouble conforming to the classroom environment were common reasons teachers cited for retaining first grade students (Cadigan, Entwisle, Alexander, & Pallas, 1988; Dauber, Alexander, & Entwisle, 1993). However, in later grades, low academic achievement was the primary reason cited for grade retention (Agostin & Bain, 1997; Cadigan et al., 1988; Dauber et al., 1993).

At the other end of the spectrum of classroom behavior, externalizing behavior such as disruptive and aggressive behavior has long been tied to poor academic outcomes (Kellam et al., 1998). Disruptive or problem behavior has consistently been associated with a higher risk of poor academic performance and other negative outcomes. For example, Reinke (2008) found that co-occurring externalizing problems and academic problems in first grade were significantly associated with negative outcomes, including school suspensions and academic failure in 6th grade. Students with externalizing behavior are also more likely to be rejected by their peers, have substance use problems, and engage in delinquent behavior in

adolescence (Fergusson, Horwood, & Ridder, 2005; Moffitt, 1993; Schaeffer et al., 2006; Schaeffer, Petras, Ialongo, Poduska, & Kellam, 2003).

Moreover, academic problems and externalizing problems co-occur more frequently than would be expected by chance alone (Bradshaw, Buckley, & Ialongo, 2008; Hinshaw, 1992). Hinshaw (1992) concluded that most students with learning problems will also display externalizing symptoms in the classroom. In the Isle of Wight epidemiological study, Rutter and Yule (1970) found that students who experienced reading problems had four times higher the risk of antisocial behavior than children in the general population. McKinney (1989) found that students with both learning disabilities and externalizing problems had a much greater risk of later academic problems than students with learning disabilities who displayed internalizing symptoms or students with co-occurring behavioral problems. In a latent class analysis of co-occurring behavioral and academic problems, Darney et al. (2013) found that first grade students with behavioral and academic problems had a higher risk of negative outcomes that persisted through 12th grade.

Past research has also found variation in the pattern of co-occurring academic and behavioral problems by gender (Darney et al., 2013; Reinke et al., 2008). Boys with reading problems in elementary school have a higher risk for conduct disorder than girls with reading problems (Williams & McGee, 1994). Finally, Reinke et al (2008) conducted a gender stratified latent class analysis of co-occurring academic and behavioral problems and found separate class structures for girls and boys; there was a class of boys that only displayed problem behaviors (without academic problems) that was not found in the sample of girls.

A study by Miles and Stipek (2006) used path analysis to test associations between aggression and literacy achievement and pro-social behavior and literacy achievement. Their analysis showed different patterns of association between pro-social behavior and literacy

achievement and aggressive behavior and literacy achievement over time. The association between aggressive behavior and literacy achievement increased over time and the association between pro-social behavior and achievement decreased over time (Miles & Stipek, 2006). The authors suggest that the different patterns of association indicate that problematic behavior and pro-social behavior represent distinct behavioral constructs instead of opposite ends of a continuum of classroom behavior (Miles & Stipek, 2006).

Academic Behaviors and Standardized Test Scores

Two common measures of academic performance are standardized achievement test scores and grade point average (GPA). GPA is one important indicator of how well students perform in their classes and has been shown to be an important predictor of school completion and college success (C. A. Farrington et al., 2012; Jacob, 2001; Roderick, Nagaoka, & Allensworth, 2008). Grades may offer more insight on student performance than standardized test scores because they reflect content knowledge and the degree to which a student has successfully developed a set of academic behaviors that enable performance (Heckman, Stixrud, & Urzua, 2006; Lindqvist & Westman, 2011). In contrast, standardized test scores primarily reflect content knowledge and learning skills and thus may be less influenced by social skills and externalizing behaviors (Conley, 2003; Farkas, 2003; Paris & Winograd, 1990). However, Wentzel (1993) found significant associations that pro-social, antisocial, and academic skills were significantly associated with students' grades, but only pro-social behaviors had a significant association with standardized achievement test scores. Therefore the importance of non-cognitive skills and standardized achievements is not fully clear.

The federal No Child Left Behind Act was a landmark education policy intended to close the achievement gap and improve student achievement. Key components of the policy include a focus on evidence-based education methods, stronger emphasis on teacher quality, and strong accountability standards for schools (*No Child Left Behind (NCLB) Act of 2001*, 2001). Under No Child Left Behind schools were required to begin testing reading and mathematics skills every year in grades 3 through 8, and at least once more between 10th and 12th grade. States are required to set standards for grade level expectations that are measured in terms of proficiency level: basic, proficient, and advanced. Public schools are required to demonstrate that they have made adequate yearly progress toward meeting proficiency standards outlined by the state, with the overarching goal that all students be proficient at their grade level expectations by 2014. Schools that fail to make adequate progress in improving test scores may face some form of restructuring. Malmgreen, McLaughlin, and Nolet (2005) found that regardless of general education or special education status, all students could demonstrate proficiency on standardized tests provided they received high quality teaching. They suggest that when a high percentage of students in a school are unable to meet proficiency standards it is an indication that the entire student population is at risk for academic failure (Malmgren et al., 2005). Identifying students who are at high risk of not meeting proficiency standards early in the academic year would allow educators to provide appropriate interventions.

Considerable research shows that well designed interventions promoting social and emotional learning also have positive effects on academic achievement (Greenberg et al., 2003; Zins, Weissberg, Wang, & Walberg, 2004). However, the accountability requirements measured by test schools under No Child Left Behind may leave school officials hesitant to direct resources away from academic-focused programs and cause interventions to social and

emotional learning programs (Fleming et al., 2005; Kaftarian et al., 2004). Understanding the ways in which both pro-social behavior and disruptive behavior are related to achievement, particularly test scores, has practical implications in terms of recommendations for interventions schools can implement to improve standardized test performance.

To that end, the goal of this analysis is to describe how patterns of academic behaviors (e.g., learning skills, social skills, and problem behaviors) relate to standardized test scores. Social skills and problems behaviors are often conceptualized as mediators between academic ability and performance. While understanding the mechanisms by which non-cognitive factors influence performance is important for understanding the etiology of low academic performance, this approach is often not reflective of how these behaviors are displayed in a classroom environment. Therefore, this study will use a person-centered approach to develop unobserved, latent classes of students based on their cooperation, assertion, self-control, and externalizing, internalizing, and hyperactivity behaviors. Past studies have taken a similar approach to developing classes of students based on co-occurring behavioral and academic problems but have not included social skills (Darney et al., 2013; Reinke et al., 2008), which past research suggests may be particularly salient in elementary grades. This study will explicitly include social skills in the development of the latent classes, as they have been shown to correlate with high academic performance. As the extant research suggests, there may be important differences in problem behaviors across gender, so the analysis will be stratified by gender.

The Multiple Opportunities for Reaching Excellence Project

The data for this study come from a prospective, community-based epidemiological study of urban school children in Baltimore, MD. The Multiple Opportunities for Reaching Excellence (MORE) Project was a prospective three-year cohort study of the influence of community violence exposure on youth development (Cooley-Strickland et al., 2009). Students were recruited from six elementary schools that came from three Baltimore neighborhoods that represented low, moderate, and high levels of neighborhood crime. Students were recruited over the course of one and one-half academic years in two cohorts. Recruitment for the first cohort began in January 2007; 427 children were recruited in the first cohort. The second wave of recruitment took place in fall 2007 and included an additional 256 children.

Table 8. Characteristics of MORE Project Study Sample

	Total Sample	Boys	Girls	
	(N = 597)	(N = 278)	(N = 319)	P-Value
Race/ethnicity				
African American	82.7	82.5	83.0	0.91
Grade at Consent				
Third	44.05	45.5	42.8	
Fourth	26.7	27.3	26.1	
Fifth	28.2	26.3	30.4	0.41
Free/Reduced Meals	85.1	84.3	86.0	0.46
Special Education Services	13.9	8.9	19.6	≤ 0.001
Suspensions	3.1	6.0	0.7	≤ 0.001
MSA Reading Proficiency Level				
Basic	25.1	29.4	22.3	
Proficient	59.6	54.7	58.0	
Advanced	15.3	15.8	19.7	≤ 0.001
MSA Math Proficiency Level				
Basic	25.6	29.4	22.3	
Proficient	56.5	54.7	58.0	
Advanced	17.9	15.8	19.7	0.12
Neighborhood Violence Strata				
Low Violence Stratum	42.0	39.6	44.2	
Medium Violence Stratum	31.3	29.9	32.6	
High Violence Stratum	26.6	30.6	23.2	0.13

The selection criteria for the students included: 1) full time enrollment in one of the six targeted schools in the fall of 2006 or 2007, 2) be between 8-12 years old, and 3) speak English and live with an English-speaking guardian or parent. Race/ethnicity was not used as a selection criterion in order to prevent selection bias and human subjects concerns. Students with a serious medical or neurological illness or that did not live with at least one parent or legal guardian were excluded from the study. There were 1,119 eligible students across both recruitment efforts and 702 participated (consent rate = 62%). Comparison of the demographics of the study sample to school-level means and demographics indicate there were no significant differences between the families who agreed to participate and those who did not (Cooley-Strickland et al., 2009).

This analysis includes the 597 elementary students in the MORE Project for whom teacher reports of classroom behavior and performance were collected. Second graders do

not take the Maryland School Assessment so 2nd grade students in the MORE Project were not included in this study. Table 6 describes the demographic characteristics of the students included in this sample.

Measures

The Teacher Form of the Social Skills Rating System (SSRS; (Gresham & Elliott, 1990)) has teachers individually assess students' social skills and academic performance. The screening instrument catalogues social behavior in the educational environment (Gresham & Elliott, 1990). The Teacher Form has subscales that assess social skills, problem behaviors and academic performance.

In the MORE Project, the Cooperation, Assertion, Self-Control, Internalizing, Externalizing, Hyperactivity, and Academic Competence subscales of the SSRS were used (Cooley-Strickland et al., 2009). In this sample, the Cronbach's alphas for the subscales range from 0.80 to 0.93. Cronbach's Alpha for the Academic Competence scale was 0.96 (Cooley-Strickland et al., 2009).

The seven SSRS subscales (Teacher Form) collected at the baseline assessment for each cohort were used to define the latent classes. The cooperation, assertion, and self-control scales are measures of pro-social classroom behavior. The cooperation scale measures behaviors like complying with directions, helping others in the classroom, and sharing materials. The assertion scale measures initiating behaviors and includes items that assess asking for information, initiating conversations, and joining group activities without being told. The self-control scale assesses behaviors that occur in conflict situations, such as controlling temper in conflicts with peers, and behaviors that occur in non-conflict

situations, such as compromising with other students and taking turns (Gresham & Elliott, 1990).

The internalizing, externalizing, and hyperactivity scales measure different problem behaviors. The internalizing scale includes measures of low self-esteem, loneliness, anxiety, and sadness. The externalizing scale measures “acting out” behaviors such as getting angry easily and fighting with other students. The hyperactivity scale includes measures of how easily the student is distracted or fidgets in the classroom. The academic competence scale assesses teacher-reported reading and math skills, and motivation to do well in school (Gresham & Elliott, 1990).

The seven SSRS scales were dichotomized into binary indicators. For the externalizing, internalizing, and hyperactivity score, the binary indicator represents the highest quartile of problem behaviors, and for the cooperation, assertion, self-control, and academic competence scale, the binary indicators represents the lowest quartile of the behaviors, so that for all indicators a value of “1” indicates a problem behavior. Past studies (Darney et al., 2013; Reinke et al., 2008) have taken a similar approach based on the recommendations from Farrington and Loeber (2000), and a similar coding strategy in this analysis will facilitate the interpretation of model results.

Academic records from the Baltimore City Public School System (BCPSS) for the 2006-2007 and 2007-2008 academic years were linked to MORE Project participants. Data on attendance, special education status, limited English proficiency status, and Maryland School Assessment (MSA) math and reading scores are available.

The Maryland School Assessment (MSA) math and reading scale scores for the baseline data collection and Year 2 follow-up will be used as distal outcomes in this analysis. Maryland students take the MSA tests every year in grades 3-8th and these tests fulfill the

federal testing requirements for No Child Left Behind. The reading and math MSA test Maryland content standards specified in the State Curriculum for math and reading and are specific to grade level expectations. The MSA reading test assesses general reading processes, informational text comprehension, and literary text comprehension. The MSA math test assesses algebra/patterns, geometry/measurement, statistics/probability, number concepts/computation, and processes of mathematics.

The scale scores for the MSA reading and math tests are not comparable across grade levels. Each grade level test has a different mean and standard deviation, and threshold levels for determining proficiency levels vary by grade as well. So that children across multiple grades could be included in one analysis, the MSA scale scores were standardized ($M = 0$, $SD = 1$) by grade level.

Statistical Analysis

Latent class analysis was used to measure the associations between academic behaviors and standardized test scores. Latent class analysis is a person-centered method in which students are grouped together into discrete latent (i.e., unobserved) classes based on degree of similarity in their responses to the SSRS indicators. In the first stage, latent class analysis was used to create mutually exclusive categories of academic behaviors (from the SSRS scale scores and then latent class membership will be linked to outcomes (standardized test scores).

Latent class analysis is a model-based approach to forming clusters of observations. Two types of parameters define the latent class model: the class prevalences and the conditional probabilities of each item. Conditional probability values characterize the association between the manifest variable (i.e., each of the SSRS scales) and the latent class,

and are used to interpret the nature of the latent class (Bandeem-Roche, Huang, Munoz, & Rubin, 1999; Jung & Wickrama, 2008).

The primary assumption in a latent class model is conditional independence, which states that within each class, the association between the observed indicators is zero. Magidson and Vermunt (2000) recommend using bivariate standardized residuals (BVRs) to check for violations of the conditional independence assumptions. There are no formal criteria when assessing bivariate standardized residuals, but the general recommendation is that many values “substantially” larger than 1.96 indicate that the correlation between a pair of indicators has not been fully explained by the latent class model.

Unlike traditional clustering techniques, the number of latent classes that are included in the model is strongly guided by statistical testing rather than a priori decisions about the underlying data structure (Nylund, Asparouhov, & Muthén, 2007). There is not a single fit statistic that fully describes model fit. Rather a series of fit statistics, including the bootstrapped likelihood ratio test (BLRT), Bayesian Information Criteria and the sample-size adjusted BIC, and the Lo-Mendall-Rubin Likelihood ratio test are collectively used to judge model fit (Nylund et al., 2007). For this study, the BIC and the sample-size adjusted BIC were the primary fit statistics used to guide model selection in this study. The BLRT is generally considered the strongest indicator of model fit, but the BLRT test cannot be combined with the clustering option in Mplus so it was not used in this analysis (Muthén & Muthén, 2013; Nylund et al., 2007).

To determine the optimal number of latent classes, the fit statistics from a series of iterative models with increasing number of latent classes were compared. The intent is to select the most parsimonious model (i.e., the fewest number of latent classes) that provides an adequate description of the data and confirms with theoretical knowledge of the latent

variable of interest. The decision on the final model took into consideration the fit-statistics, the bivariate standardized residuals, class prevalences, and the interpretation of the class structure itself (Magidson & Vermunt, 2000; Nylund et al., 2007; Vermunt & Magidson, 2002).

The Mplus AUXILIARY option that uses posterior probability based multiple imputations was used to estimate mean values of demographic characteristics for each of the classes (Muthén & Muthén, 2013).

Distal Outcomes

Once the final latent class structure was selected, associations between latent class membership and standardized math and reading test scores were examined. For this, a bias corrected three-step procedure developed by Vermunt was used to estimate these associations (Vermunt, 2010). Estimating the latent class model without the distal outcome is the first step in the corrected three-step procedure. After the latent class model has been estimated, a new variable C is created by assigning each individual to the estimated class in which he/she has the highest probability of being assigned given observed covariates. Measurement error for class membership (i.e. classification uncertainty rate) is then calculated (Asparouhov & Muthén, 2013; Feingold, Tiberio, & Capaldi, 2013; Vermunt, 2010). In the final step, the association between distal outcome and the new variable C is measured while also correcting for measurement error in C. This is done by including the distal outcome and the new variable C, which has been constrained by the measurement error that was estimated in the second step, in a new latent class model. Constraining the new C variable accounts for the uncertainty in class assignment and fixes the parameter values in the third latent class model to the values estimated in the first model (Bakk, Tekle,

& Vermunt, 2013; Vermunt, 2010). Wald tests can then be used to test if mean levels of the distal outcome vary across classes. In testing for differences in the distal outcomes across the latent classes, standard errors were calculated to reflect the clustering of students within schools (Muthén & Muthén, 2013). The data samples and latent class models were generated and estimated separately for boys and girls.

Missing data

Mplus's full maximum likelihood estimation was used to account for missing data in the sample (Arbuckle, 1996; Muthén & Muthén, 2013). Across the SSRS indicators, less than 1% of the full sample was missing data. For the concurrent test scores, 4.67% of boys were missing reading and math MSA test scores, and 4.4% of the girls were missing test scores. However, in the year 2 outcomes, 26.6% of boys were missing test scores and 21.6% of girls were missing test scores. As all of the mean distal outcome values were statistically treated as indicator values in a latent class analysis model, Mplus's full maximum likelihood estimation was used to handle the missing values in the distal outcomes.

3.4 Results

Girls

A series of two to five-class models were estimated with the Mplus statistical package. For girls, the three-class model emerged as the best fitting model. The AIC and aBIC values for the four-class and five-class models were lower than the three-class model, but the decreases were moderate. The standardized marginal bivariate residuals did not indicate problems with the fit of the three-class model; additionally, the substantive interpretation of the four-class model did not reveal important differences from the three-

class model, so the three-class model was selected as the final model. There were 180 girls in class 1 (56.4%), 90 girls in class 2 (28.2%), and 49 girls in class 3 (15.4%). Table 9 provides the model fit indexes for the two-, three-, four-, and five-class model for girls. The bivariate standardized residuals, displayed in Table 10 did not indicate any problems with the three-class model.

Table 9. Fit Statistics, Girls

	Class 2	Class 3	Class 4	Class 5
# of Parameters	15	23	31	39
Log - Likelihood	-1026.11	-1011.42	-999.54	-988.62
AIC	2082.23	2068.85	2061.08	2055.23
BIC	2138.70	2155.45	2177.81	2202.07
aBIC	2091.13	2082.50	2079.48	2078.37

Table 11 displays the conditional item probabilities for the three-class model for girls. Class 1 was characterized by low risk of problem behaviors or academic problems. The average age of girls in this class is 9.2, 80% were black, 80% participated in the free or reduced lunch program, less than 5% were receiving special education services, and the average attendance for the baseline year was 96%. This class was labeled the High-Performing class.

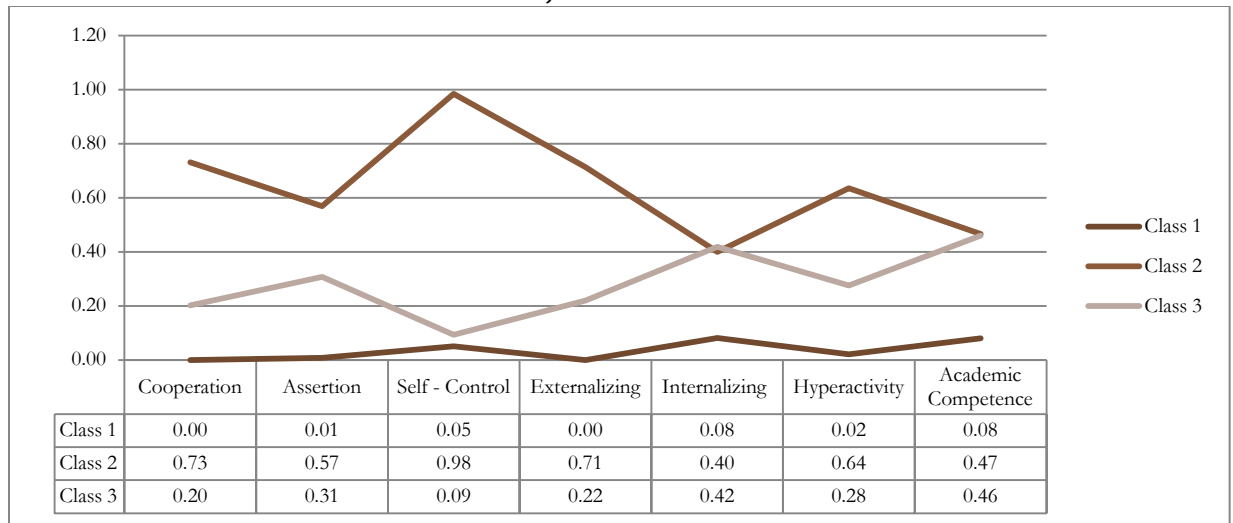
Table 10. Standardized Bivariate Residuals, 3 Class model - Girls

	Cooperation	Assertion	Self-Control	Externalizing	Internalizing	Hyperactivity
Cooperation	**					
Assertion	0.63	**				
Self-Control	0.02	0.144	**			
Externalizing	0.89	-0.61	0.03	**		
Internalizing	-0.46	1.572	-0.113	0.776	**	
Hyperactivity	0.43	-1.218	-0.131	1.278	-0.367	**
Academic Competence	0.94	-0.593	-0.107	-0.092	-0.093	0.389

Class 2 was characterized by high probabilities of cooperation, self-control, and hyperactivity problems and moderate risk for assertion and academic problems. The average age of girls in this class was 9.5, 89% were African-American, 13.8% were receiving special education services, 90% participated in the free and reduced lunch program, and average

attendance was 95.4%. Due to the high probabilities of cooperation, self-control and hyperactivity problems this class was labeled the Poor Social Skills/Average-Performing class.

Table 11. Conditional Item Probabilities, Girls



Class 3 was characterized by modest risk for internalizing problems and academic problems. The average age of girls in this class was 9.5, 80% were African-American, 13.1% were receiving special education services, 84% participated in the free and reduced lunch program, average attendance was 95.2%, and the average MESA school hassles score was 1.3. This class was labeled the Internalizing/Average-Performing class.

Boys

Table 12 provides the model fit indexes for the two-, three-, four-, and five-class models for boys. For boys, the BIC favored the three-class model but the aBIC favored the four-class model. The four-class model would have been more consistent with past studies (Darney et al., 2013; Reinke et al., 2008) but the smallest class in this model only contained 26 students, which accounted for less than 10% of the sample. Table 10 presents the

standardized bivariate residuals for the three-class model. There is only one bivariate standardized residual greater than 1.96; the remaining bivariate residuals had an absolute value less than 1. When considering parsimony, class prevalences, the BIC, and limited signs of local dependence with the bivariate residuals, the three-class model was selected as the final model. There were 163 boys in class 1 (58.6%), 72 boys in class 2 (25.9%), and 43 boys in class 3 (15.4%).

Table 12. Fit Statistics, Boys

	Class 2	Class 3	Class 4	Class 5
# of Parameters	15	23	31	39
Log - Likelihood	-893.96	-865.75	-846.62	-839.31
AIC	1817.91	1777.50	1755.23	1756.62
BIC	1872.33	1860.94	1867.69	1898.10

Table 14 displays the conditional item probabilities for the three-class model for boys. Class 1 was characterized by low risk of problem behaviors or academic problems. The average age of boys in this class was 9.6, 84% were black, 86% participated in the free or reduced lunch program, 13.5% were receiving special education services, and the average attendance for the baseline year was 96%. This class was labeled the High-Performing class.

Table 13. Standardized Bivariate Residuals, 3 Class model, Boys

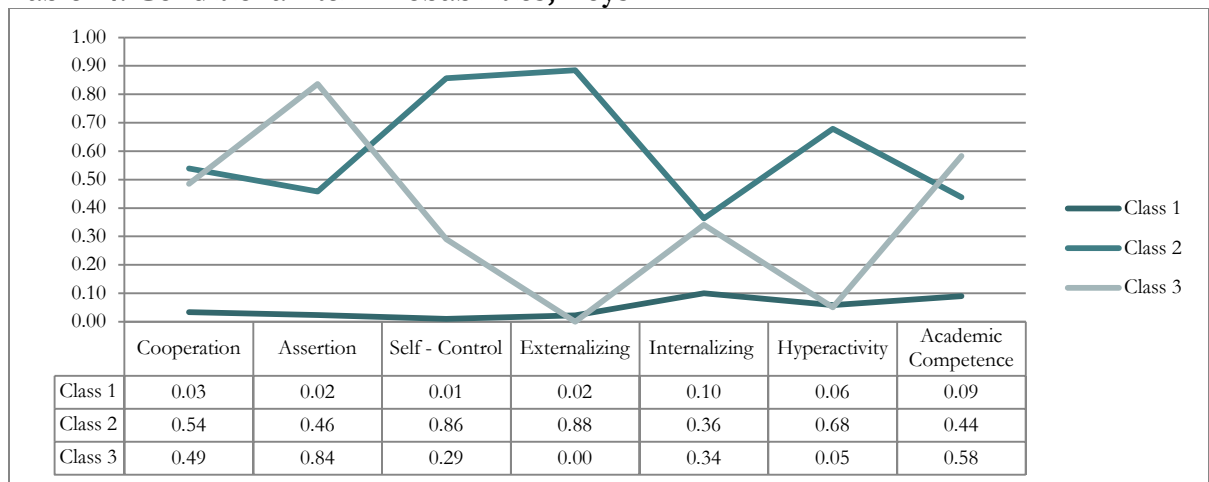
	Cooperation	Assertion	Self-Control	Externalizing	Internalizing	Hyperactivity
Cooperation	**					
Assertion	0.68	**				
Self-Control	0.57	0.548	**			
Externalizing	-0.31	-0.097	0.126	**		
Internalizing	0.54	0.927	-0.371	-0.153	**	
Hyperactivity	0.96	-0.312	-0.305	0.024	0.756	**
Academic Competence	2.25	0.578	-0.312	0.032	0.354	0.676

Class 2 was characterized by high probabilities of self-control, externalizing, and hyperactivity problems and moderate risk for cooperation, assertion, and academic problems. The average age of boys in this class was 9.5, 79% were African-American, 25% were receiving special education services, 83% participated in the free and reduced lunch

program, average attendance was 93%. This class was labeled the Disruptive Behavior/Average-Performing class.

Class 3 was characterized by a high risk of assertion and academic problems and modest risk for cooperation, self-control, and internalizing problems. The average age of boys in this class was 9.4, 87% were African-American, 32.4% were receiving special education services, 88% participated in the free and reduced lunch program, and the average attendance was 95%. This class was labeled the Low Social Skills/Low-Performing class.

Table 14. Conditional Item Probabilities, Boys



A brief summary of the latent class structures for both girls and boys is provided below in Table 13. The latent classes in the MORE Project sample differ slightly from other studies that have also used a latent class approach. Reinke et al (2008) used indicators of aggressive/disruptive behavior and academic problems to separate subjects into a "no problems" class, a "behavioral and academic problems" class, and an "academic problems only" class for girls. The same study found a found four-class solution for boys that included a "no problems" class, an "academic and behavioral problems" class, a "behavior problems only" class, and an "academic problems only" class (Reinke et al., 2008).

Table 15. Description of Latent Classes

Latent Class Name	Class Prevalences	Class Description
Class 1 Girls: High Performers Boys: High Performers	Girls: 56% Boys: 58%	Girls and Boys: Low risk of poor social skills, problem behaviors, or academic problems
Class 2 Girls: Poor Social Skill/Average Performers Boys: Disruptive Behavior/Low Performers	Girls: 28% Boys: 26%	Girls: High risk for cooperation, self-control, hyperactivity problems/moderate risk for academic problems Boys: High risk for self-control, externalizing, and hyperactivity problems/moderate risk for academic problems
Class 3 Girls: Internalizing/Average performers Boys: Low Social Skills/Low Performers	Girls: 15% Boys: 15%	Girls: modest risk for internalizing problems and academic problems Boys: High risk of assertion problems/ modest risk for cooperation and academic problems

Associations between Latent Class Membership and Test Scores

In the next stage of the analysis, the associations between class membership and student standardized math and reading test scores were examined separately for girls and boys. In these models, MSA reading and math test standardized scores were included in the latent class model as distal outcomes to assess the influence of class membership on test scores. Using the Vermunt three-step approach, math and reading scores were not used to define the class structure, but variation in the test scores across latent classes can be assessed through post hoc comparisons.

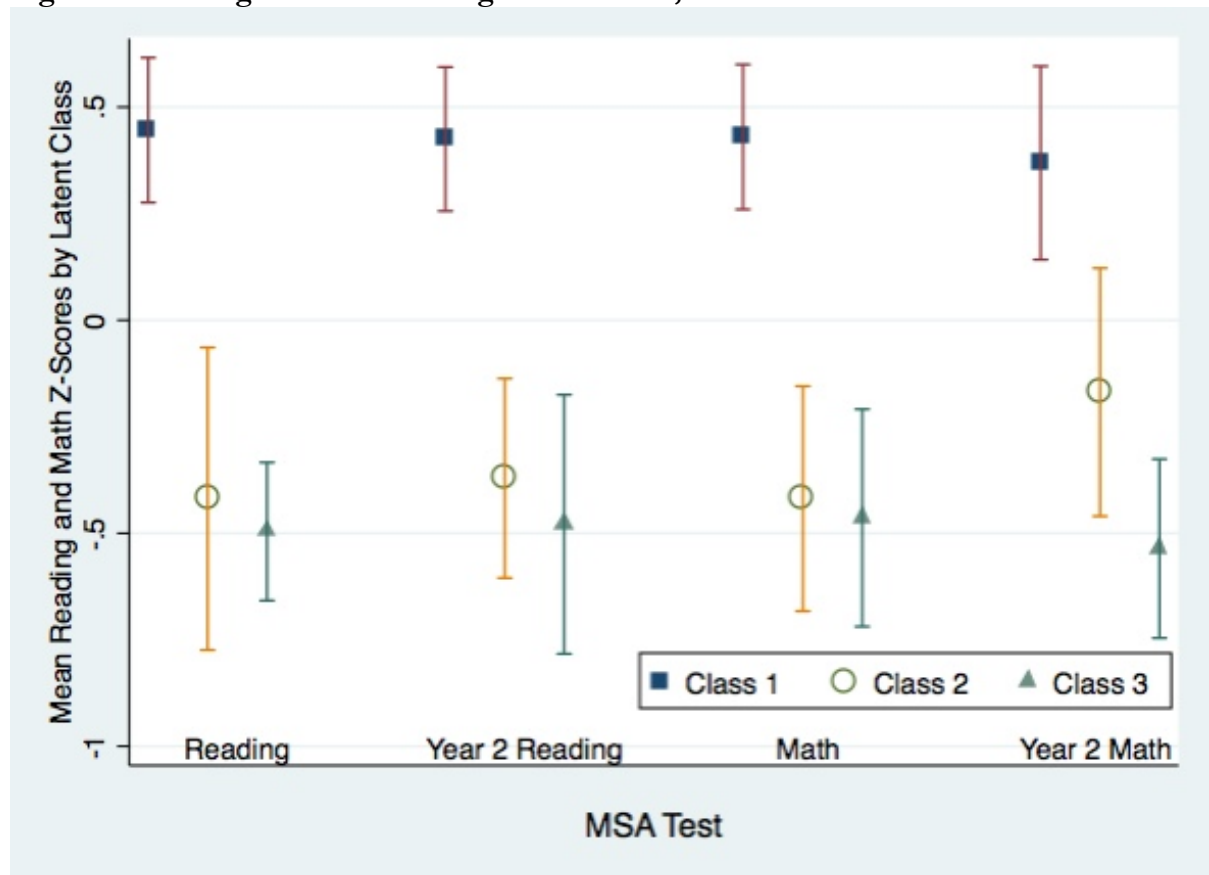
Distal Outcomes - Girls

Table 16 presents the baseline and Year 2 comparisons for reading and math test scores for girls. Figure 7 presents a plot of mean reading and math test scores (with confidence intervals) by latent class. For the baseline reading test scores, the average reading scores in Class 1 (High-Performing) was significantly higher than average reading scores in Class 2 (Poor Social Skills/Average-Performing) and Class 3 (Internalizing/Average-

Performing). The mean scores in Class 1 were 0.87 standard deviations higher than in the Poor Social Skills/Average-Performing class ($p\text{-value} = 0.01$). Comparing the High-Performing class to the Internalizing/Average-Performing class, mean test scores were 0.94 standard deviations higher in the High Performing class ($p\text{-value} < 0.001$). Mean test scores in the Poor Social Skills/Average-Performing class were only 0.08 standard deviations higher than mean scores in the Internalizing/Average-Performing class, a difference that was not significant ($p\text{-value} = 0.79$).

A similar pattern was observed for the Year 2 Reading scores. The mean scores in the High-Performing class were 0.85 standard deviations higher than the Poor Social Skills/Average-Performing class ($p\text{-value} < 0.001$). Comparing the High-Performing class to the Internalizing/Average-Performing class, mean test scores were 0.90 standard deviations higher in the High-Performing class ($p\text{-value} < 0.001$). Mean test scores in the Poor Social Skills/Average-Performing class were only 0.11 standard deviations higher than mean scores in the Internalizing/Average-Performing class, a difference that was not significant ($p\text{-value} = 0.75$).

Figure 7. Reading and Math Average Test Scores, Girls



For the baseline math test score, the High-Performing class again had significantly higher scores than the Poor Social Skills/Average-Performing class and the Internalizing/Average-Performing class. The High-Performing class math z-scores were 0.85 standard deviations higher than in the Poor Social Skills/Average-Performing class (p -value < 0.001). The High-Performing class average test scores were 0.89 standard deviations higher than in the Internalizing/Average-Performing class (p -value < 0.001). Mean math test scores were not significantly different between the Poor Social Skills/Average-Performing and the Internalizing/Average-Performing class (p -value = 0.86).

Table 16. MSA Reading and Math Average Test Scores, Girls

Baseline Reading Scores					
Contrast	C1	C2	C3	Difference	P-Value
C1 vs C2	0.45	-0.42		0.87	0.01
C1 vs C3	0.45		-0.50	0.94	0.00
C2 vs C3		-0.42	-0.50	0.08	0.79
Year 2 Reading Scores					
Contrast	C1	C2	C3	Difference	P-Value
C1 vs C2	0.43	-0.37		0.80	0.00
C1 vs C3	0.43		-0.48	0.90	0.00
C2 vs C3		-0.37	-0.48	0.11	0.75
Baseline Math Scores					
Contrast	C1	C2	C3	Difference	P-Value
C1 vs C2	0.43	-0.42		0.85	0.00
C1 vs C3	0.43		-0.46	0.89	0.00
C2 vs C3		-0.42	-0.46	0.05	0.86
Year 2 Math Scores					
Contrast	C1	C2	C3	Difference	P-Value
C1 vs C2	0.37	-0.17		0.54	0.00
C1 vs C3	0.37		-0.54	0.91	0.00
C2 vs C3		-0.17	-0.54	0.37	0.08

For the Year 2 math test scores, the High-Performing class average test scores were 0.54 standard deviations higher than the Poor Social Skills/Average-Performing class; this was a significant difference ($p\text{-value} < 0.001$). The High-Performing class Year 2 math test scores were 0.91 standard deviations higher than the Internalizing/Average-Performing class Year 2 test scores ($p\text{-value} < 0.001$). The mean test scores between the Poor Social Skills/Average-Performing and the Internalizing/Average-Performing class were not significantly different ($p\text{-value} = 0.08$).

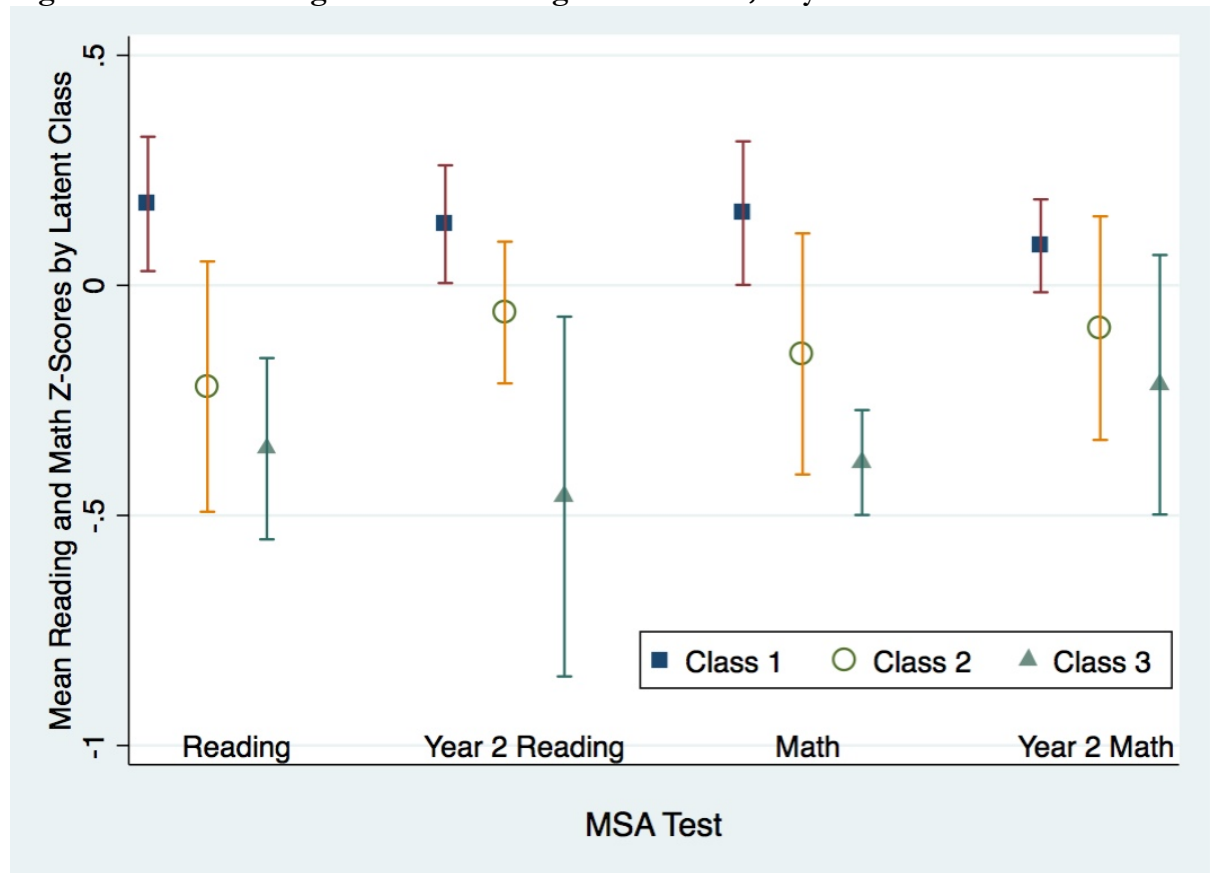
Distal Outcomes - Boys

Table 17 presents the baseline and Year 2 comparisons for reading and math test scores for boys. For the baseline reading test scores, the average reading test scores in Class 1 (High-Performing) was significantly higher than average reading z-scores in Class 2 (Disruptive Behavior/Average-Performing) and Class 3 (Low Social Skills/Low-Performing). The mean scores in the High-Performing class were 0.40 standard deviations

higher than in the Disruptive Behavior/Average-Performing class ($p\text{-value} = 0.02$).

Comparing the High-Performing class to Class 3, mean test scores were 0.53 standard deviations higher in the High-Performing class ($p\text{-value} < 0.001$). Mean test scores in the Disruptive Behavior/Average-Performing class were only 0.14 standard deviations higher than mean scores in the Low Social Skills/Low-Performing class, a difference that was not significant ($p\text{-value} = 0.46$).

Figure 8. MSA Reading and Math Average Test Scores, Boys



For the Year 2 Reading Scores, there were no significant differences between the three classes. Average test scores in the High-Performing class were only 0.19 standard deviations higher than the Disruptive Behavior/Average-Performing class ($p\text{-value} = 0.13$) and 0.59 standard deviations higher than Class 3 ($p\text{-value} = 0.14$). Average test scores in the

Disruptive Behavior/Average-Performing class were 0.40 standard deviations higher than in the Low Social Skills/Low-Performing class (p-value = 0.29).

Table 17. MSA Reading and Math Average Test Scores, Boys

Baseline Reading Scores					
Contrast	C1	C2	C3	Difference	P-Value
C1 vs C2	0.18	-0.22		0.40	0.02
C1 vs C3	0.18		-0.36	0.53	0.00
C2 vs C3		-0.22	-0.36	0.14	0.46
Year 2 Reading Scores					
Contrast	C1	C2	C3	Difference	P-Value
C1 vs C2	0.13	-0.06		0.19	0.13
C1 vs C3	0.13		-0.46	0.59	0.14
C2 vs C3		-0.06	-0.46	0.40	0.29
Baseline Math Scores					
Contrast	C1	C2	C3	Difference	P-Value
C1 vs C2	0.16	-0.15		0.31	0.07
C1 vs C3	0.16		-0.39	0.54	0.00
C2 vs C3		-0.15	-0.39	0.24	0.28
Year 2 Math Scores					
Contrast	C1	C2	C3	Difference	P-Value
C1 vs C2	0.09	-0.09		0.18	0.33
C1 vs C3	0.09		-0.22	0.30	0.16
C2 vs C3		-0.09	-0.22	0.12	0.12

For the Year 2 Reading Scores, there were no significant differences between the three classes. Average test scores in the High-Performing class were only 0.19 standard deviations higher than the Disruptive Behavior/Average-Performing class (p-value = 0.13) and 0.59 standard deviations higher than Class 3 (p-value = 0.14). Average test scores in the Disruptive Behavior/Average-Performing class were 0.40 standard deviations higher than in the Low Social Skills/Low-Performing class (p-value = 0.29).

For the baseline math test scores, average math test scores in the High-Performing class were 0.31 standard deviations higher than average test scores in the Disruptive Behavior/Average-Performing class; this difference was marginally significant (p-value = 0.07). The High-Performing class average math test scores were 0.54 standard deviations higher than average test scores in the Low Social Skills/Low-Performing class, a significant difference (p-value < 0.001). The average mean math test scores in the Disruptive

Behavior/Average-Performing class were 0.24 standard deviations higher than the average math test scores in the Low Social Skills/Low-Performing class; this was not a significant difference ($p\text{-value} = 0.28$).

For the Year 2 Math test scores, there were no significant differences between the three classes. Average math test scores in the High-Performing class were only 0.18 standard deviations higher than the Disruptive Behavior/Average-Performing class ($p\text{-value} = 0.33$) and 0.30 standard deviations higher than Class 3 ($p\text{-value} = 0.16$). Average test scores in the Disruptive Behavior/Average-Performing class were 0.12 standard deviations higher than the Low Social Skills/Low-Performing class ($p\text{-value} = 0.12$).

3.5 Discussion

The purpose of this study was to develop gender-specific latent classes of students based on a set of academic behaviors: social skills, problem behaviors, and teacher-rated academic competence, and to test for differences in standardized test performance across these latent classes. Past research has shown that problem behaviors and low academic performance frequently co-occur; however, few available studies have also examined deficits in social skills in students with co-occurring problematic behaviors and low academic performance.

Summary of Major Findings

A three-class structure was found for both boys and girls; however, as expected, the nature of the classes varied across gender. For both boys and girls, the High-Performing class was the largest class and both boys and girls in that class had low probabilities of displaying poor social skills, problem behaviors, or academic difficulties. For girls, the

remaining two classes both displayed moderate risk of academic problems and were distinguished by the degree of their poor social skills and their levels of internalizing problems. For the boys, the poor social skills and externalizing problems were displayed in the class with moderate risk of teacher-rated academic problems. Boys with the highest risk of academic problems also had moderate risk of internalizing problems.

For girls, Class 2 (Poor Social Skills/Average-Performing) and Class 3 (Internalizing/Average-Performing) consistently had comparable test scores for both reading and math that were significantly lower than the average test scores in the High-Performing class. This pattern of differences in test scores across the three classes is in line with past work that suggests that non-cognitive skills have greater effect on student grades than achievement test scores. The risk of academic problems was similar between the Poor Social Skills/Average-Performing class and the Internalizing/Average-Performing class, which mirrors the similarity seen in test scores.

The pattern is less clear for boys. For the concurrent reading and math scores, the High-Performing class did have higher test scores than the Disruptive Behavior/Average-Performing class and the Low Social Skills/Low-Performing class. However, in the Year 2 test scores, there were no significant differences between the three classes. The pattern of mean differences in the concurrent test scores aligns with the conclusions made from the sample of girls. It is unclear if the failure to find differences in the Year 2 test scores across the classes of boys is due to a true consistency in the means or a reduction in power due to attrition in the sample. Also of note in the sample of boys, the Low Social Skills/Low-Performing class had a very low probability of externalizing problems but had slightly higher levels of teacher-reported problems with academic competence than the boys in the Disruptive Behavior/Average-Performing. The difference in the patterns of problem

behaviors between the two classes and the comparable baseline test scores is consistent with findings from Miles and Stipek (2006) that suggest that low social skills and problem behavior are distinct risk factors for low academic performance.

These data do not suggest that there is a single pattern of teacher-rated academic, social, and behavioral competencies that increase risk for poor performance on standardized tests. However, all four of the low-performing classes (Girls: Poor Social Skills/Average-Performing, Girls; Internalizing/Average-Performing, Boys: Disruptive Behavior/Average-Performing, Boys: Low Social Skills/Low-Performing) displayed some level of problematic social skills or problematic behavior in addition to having low teacher-rated academic competency. Unlike past studies, there was no evidence of a class for either boys or girls that only displayed academic problems; academic problems co-occurred with either problematic/externalizing behaviors or poor social skills (Darney et al., 2013; Reinke et al., 2008).

These findings do suggest that problems in one domain (i.e. social skills, problematic behavior, and academic ability) are not limited, and that children who have a high risk of poor academic performance may struggle with multiple sets of competencies. Moreover, these findings are consistent with research that shows that social development and academic achievement are not independent processes (Miles & Stipek, 2006). Aggressive and problematic behaviors are known risk factors for poor achievement. However, this research suggests that poor social skills, which may be a distinct set of behaviors, are also associated with increased risk of low achievement, and comprehensive interventions that address a range of social and behavioral skills sets may be warranted (Malecki et al., 2002; Miles & Stipek, 2006).

There are several limitations of this study that should be addressed. First, this study used standardized MSA scores rather than proficiency levels. This was primarily a methodological consideration, as methods to handle categorical distal outcomes in latent models are not well developed, particularly for clustered data (Feingold et al., 2013). Proficiency levels are more consistent state accountability standards under the NCLB, but using standardized scores does allowed us to use the appropriate statistical test for differences across latent class within the latent class models. This study also did not control for any contextual factors that may influence test performance; future work could extend this model to include covariates that predict latent class membership that may be associated with test performance.

The strengths of this study are that it draws from a community-based sample of urban school children that represent multiple schools. Also, by using a latent class model, this study was able to model a range of academic behaviors that included social skills and problem behaviors and how the patterns of these behaviors related to test performance.

Chapter 5. Neighborhood Predictors of Children's Patterns of Social, Behavioral, and Academic Competencies

5.1 Abstract

This study used latent class regression to estimate the association between neighborhood characteristics and children's patterns of academic, social and behavioral competencies. Separate analyses were conducted for boys and girls to examine the associations between perceived and objective measures of community violence and feelings of neighborhood safety and latent classes of classroom competencies. For girls, witnessing violence increased the risk of being in the latent class characterized by poor social skills and moderate academic problems. Feeling safe in their neighborhood had a significant association with membership in the class characterized by high levels of academic, social, and behavioral competencies. For boys, being a victim of community violence was a significant predictor of membership in the latent class characterized by disruptive behavior and academic problems.

5.2 Introduction

Reducing the achievement gap and fostering academic achievement are national priorities (*No Child Left Behind (NCLB) Act of 2001.*, 2001). The importance of early academic success in elementary school is often framed as a problem limited to the educational system; however, the consequences of poor academic performance extend beyond a child's time in school and have important social implications (Entwisle, Alexander, & Olson, 2005, 2007; Masten et al., 2005; Needham, Crosnoe, & Muller, 2004). Early academic problems can set children on developmental trajectories that influence their educational and professional opportunities well into adulthood and contribute to observed patterns of social inequality

(Crosnoe, 2002; Masten et al., 2005; Miller, 1998; Rosenbaum, DeLuca, Miller, & Roy, 1999). Early academic problems also strain parent-child interactions and increase the risk of later social and emotional problems such as attention deficit hyperactivity disorder, anxiety, and major depressive disorder (Velez, Johnson, & Cohen, 1989). Low achievement is associated with higher risks of delinquent and antisocial behavior and substance use, including tobacco, illicit drugs, and marijuana (Bachman et al., 2007).

One of the strongest predictors of poor academic achievement is coming from economically disadvantaged background or belonging to a racial or ethnic minority group. Studies have found that minority urban students fall 30%-50% behind White students (Balfanz & Byrnes, 2006). Research also indicates that a child's early social context, such as the neighborhood they live in, is an important influence on early academic success (Entwistle et al., 2005). Compared to students of the same age in suburban schools, many urban students lag behind in achievement and disengage from school early. Urban minority youth appear to bear the highest burden of community violence (Richters & Martinez, 1993). Moreover, African-American youth are more likely to experience chronic community violence in their neighborhoods, which is also a risk factor for poor academic performance (Cooley-Strickland et al., 2009). This creates even greater disparities in their developmental opportunities (Hinton-Nelson, Roberts, & Snyder, 1996). Along with the chronic exposure to community violence, urban neighborhoods are often characterized by chronic poverty and overcrowding (Bell & Jenkins, 1993).

Social-Emotional Skills

Social-emotional skills include skills, behaviors, and mindsets that are distinct from academic skill or ability and that have been shown to contribute to success (typically measured

by grades) in school (C. A. Farrington et al., 2012). Farrington and colleagues describe these non-cognitive factors as a set of “academic behaviors” that collectively contribute to academic success (C. A. Farrington et al., 2012). These social-emotional skills contribute to academic success in a variety of ways, but one of the key ways in which they appear to influence outcomes is that children with social skills, emotional maturity, behavioral inhibition capacity, and motivation to learn are able to fully participate in the classroom environment and take full advantage of the learning opportunities that extend beyond didactic learning (Bandura, 1977; C. A. Farrington et al., 2012; Vygotsky, 1978). Indeed, a large component of a child’s experience in school is driven by their interactions with peers and teachers: “Within schools and classrooms, students draw upon frames of reference shared with social groups that are important to them to determine how to act and 'who to be' in school, which has implications for how they interpret the world of school and for their subsequent academic behavior” (Tough, 2012).

In support of the theories highlighting the importance of social skills, multiple studies have found positive associations between pro-social behavior and academic outcomes (DiPerna, 1999; Malecki et al., 2002; Wentzel, 1991, 1993). Research by Wentzel (1991, 1993) showed a positive correlation between pro-social behavior and standardized test scores and grades while controlling for student IQ. In a longitudinal study Teo, Carlons, Mathieu, Egeland & Sroufe (1996) found that social and emotional learning was predictive of high academic performance at 1st, 3rd, and 6th grade. Finally, in a study of urban elementary students, Malecki & Elliott (2002) found that social skills were positively associated with concurrent and future academic achievement. Specific skills that have been found to have significant associations with school achievement include pro-social behavior that facilitates positive teacher and peer relationships and behavioral self-regulation to control aggressive

and disruptive classroom behavior (Coolahan, Fantuzzo, Mendez, & McDermott, 2000; Denham & Others, 1993; Kellam, SG et al., 1998; Schaeffer et al., 2003).

Self-regulation, or self-control, consists of working memory, attentional flexibility, and behavioral inhibitory control (McClelland & Wanless, 2012). Self-regulation supports a child's ability to maintain attention on class material, comply with classroom rules, complete tasks, and control inappropriate behaviors (McClelland & Wanless, 2012). Self-regulation supports a child's ability to initiate and maintain tasks but also limits disruptive behavior; thus, it may have a two-fold effect in that it supports sustained attention on academic tasks and reduces disruptive behavior, which has demonstrated negative correlation on achievement (Kellam, SG et al., 1998; McClelland & Wanless, 2012). A large body of research has consistently demonstrated a negative association between problem behaviors and academic outcomes (Darney et al., 2013; Petras, Chilcoat, Leaf, Ialongo, & Kellam, 2004; Reinke et al., 2008; Schaeffer et al., 2006). Along with poor academic outcomes, students with externalizing problems are also more likely to be rejected by their peers, have substance use problems, and engage in delinquent behavior in adolescence (Fergusson et al., 2005; Moffitt, 1993; Schaeffer et al., 2006, 2003).

Building and maintaining positive social interactions with peers and teachers, behavioral inhibition, goal directed behavior, and complying with classroom rules are all behaviors that support academic achievement (Bierman et al., 2008; C. A. Farrington et al., 2012; McClelland & Wanless, 2012). Urban children are more likely to begin school with delays in their social competence: 20% begin kindergarten already displaying externalizing problems and 40% have deficits in their social and communication skills (Kaiser, Hancock, Cai, Foster, & Hester, 2000). As these deficits in social-emotional skills do appear to contribute to academic underachievement, it is important to understand the risk factors that contribute to

deficits in social competence. Bandura's (1977) social learning theory suggests that the learning process by which a child learns social-emotional and academic behaviors is mediated by neighborhood influences. Therefore, it is important to recognize that urban children often face neighborhoods with high levels of poverty, unemployment, high crime rates, and schools that are over-crowded and have limited resources, all of which influence a child's development.

One aspect of the neighborhood environment that may be particularly salient is community violence, which consists of "deliberate acts intended to cause physical harm against a person or persons in the community" (Cooley, Turner, & Beidel, 1995). Behavioral problems, emotional problems, and low academic performance are all associated with exposure to community violence. National estimates indicate that nearly 80% of urban youth have witnessed or directly experienced some form of violence in their community (Cooley et al., 1995; Kilpatrick, Saunders, & Smith, 2003; Stein, Jaycox, Kataoka, Rhodes, & Vestal, 2003). Longitudinal data show that rates of community violence tend to be stable over time, so children's experience to community violence tends to be chronic and influences development across the lifespan (Gorman-Smith & Tolan, 1998). Moreover, African-American youth are more likely to experience chronic community violence in their neighborhoods compared to children of other ethnic backgrounds (Cooley-Strickland et al., 2009). This creates even greater disparities in their developmental opportunities (Hinton-Nelson et al., 1996).

The psychosocial effects of community violence exposure have been extensively studied, but its subsequent influence on children's academic performance is an area where more research is needed (Bowen & Bowen, 1999; Cooley-Strickland et al., 2009; Milam, Furr-Holden, & Leaf, 2010). Schwab-Stone (1995) found an association between witnessing

violence and poor academic outcomes. Bowen and Bowen (1999) found that middle and high school students who witnessed violence had a higher risk of low school attendance, behavior problems, and failing grades. Work by Saltzman (1996) and Singer et al. (1995) found that community violence exposure was associated with declines in cognitive performance, attention problems, and overall declines in school performance. In a mediational model, Schwartz and Gorman (2003) found that depressive symptoms and disrupted behavior mediated the association between community violence exposure and poor academic performance; they suggested that community violence exposure affects the development of behavioral and attention problems in children.

Study Background and Research Questions

Collectively, the available data indicates that children's experience with violence in their community increases their risk for poor academic outcomes. The data also supports the hypothesis that community violence exposure may increase the risk of attention problems and behavior regulation, both of which are correlated with achievement. This study uses a latent class model to develop typologies of students based on their social skills, problem behaviors, and academic competence to describe patterns of academic behaviors.

The latent class model then extends to examine the extent to which the neighborhood environment predicts membership in the classes of academic behaviors, separately for boys and girls. Important differences have been found in the prevalence of exposure to community violence, psychosocial reactions to community violence, and in the associations between social-emotional skills, behavioral problems, and academic achievement between boys and girls (Cooley-Strickland et al., 2009; Pynoos et al., 1987; Selner-O'Hagan, Kindlon, Buka, Raudenbush, & Earls, 1998; Willcutt & Pennington, 2000; Williams &

McGee, 1994). Given that the past research suggests there will be differences both in the nature of the latent classes and the predictors of class membership between boys and girls, separate analysis will be done for boys and girls.

One of the challenges in interpreting the extant literature on the associations between community violence and children's development is that community violence has been operationalized through a variety of measures, including objective and perceived measures of exposure. Objective measures included indicators of the neighborhood environment that can be measured independent of the child's perception of the neighborhood (Weden, Carpiano, & Robert, 2008). Objective measures of neighborhood disorder may not be chronic stressors or risk factors if they do not influence a child's sense of wellbeing or safety in their neighborhood (Gorman-Smith & Tolan, 1998). Perceived (or subjective) measures of community violence are characterized by a child's perception of their experiences in their neighborhood (Weden et al., 2008). Objective neighborhood measures, perceived measures of community violence exposure, and feeling of neighborhood safety may have varying or different influences on the child, so all three will be examined in this paper (Bowen & Bowen, 1999; Milam et al., 2010; Oh et al., 2010; Weden et al., 2008).

5.3 Methods

The Multiple Opportunities for Reaching Excellence Project

The data for this study come from a prospective, community-based epidemiological study of urban school children in Baltimore, MD. The Multiple Opportunities for Reaching Excellence (MORE) Project was a prospective three-year cohort study of the influence of community violence exposure on youth development (Cooley-Strickland et al., 2009).

Students were recruited from six elementary schools that came from three Baltimore neighborhoods that represented low, moderate, and high levels of neighborhood crime. Students were recruited over the course of one and one-half academic years in two cohorts. Recruitment for the first cohort began in January 2007; 427 children were recruited in the first cohort. The second wave of recruitment took place in fall 2007 and included an additional 256 children. The selection criteria for the students included: 1) full time enrollment in one of the six targeted schools in the fall of 2006 or 2007, 2) be between 8-12 years old, and 3) speak English and live with an English-speaking guardian or parent. Race/ethnicity was not used as a selection criterion in order to prevent selection bias and human subjects concerns. Students with a serious medical or neurological illness or that did not live with at least one parent or legal guardian were excluded from the study. There were 1,119 eligible students across both recruitment efforts (consent rate = 67%). Comparison of the demographics of the study sample to school-level means and demographics indicate there were no significant differences between the families who agreed to participate and those who did not (Cooley-Strickland et al., 2009). This analysis includes the 597 students (86 %) in grades 3 through 6 in the MORE Project for whom teacher reports of classroom behavior and performance were collected.

Table 18. Demographic Characteristics of Study Sample

	Total Sample	Boys	Girls	
	(N = 597)	(N = 284)	(N = 244)	P-Value
Mean Age at year one (SD)	9.5 (1.08)	9.6 (1.14)	9.4 (1.02)	0.07
African American (%)	82.7	82.5	83.0	0.91
Grade at Consent				
Third (%)	44.05	45.5	42.8	
Fourth (%)	26.7	27.3	26.1	
Fifth (%)	28.2	26.3	30.4	0.41
Free/Reduced Meals (%)	85.1	84.3	86.0	0.46
Special Education Services (%)	13.9	8.9	19.6	≤ 0.001
Suspensions (%)	3.1	6.0	0.7	≤ 0.001
MSA Reading Proficiency Level				
Basic (%)	25.1	29.4	22.3	
Proficient (%)	59.6	54.7	58.0	
Advanced (%)	15.3	15.8	19.7	≤ 0.001
MSA Math Proficiency Level				
Basic (%)	25.6	29.4	22.3	
Proficient (%)	56.5	54.7	58.0	
Advanced (%)	17.9	15.8	19.7	0.12
Mean Attendance at year one (SD)	95.6 (5.7)	95.4 (6.5)	95.8 (4.83)	0.32
Neighborhood Violence Strata				
Low Violence Stratum	42.0	39.6	44.2	
Medium Violence Stratum	31.3	29.9	32.6	
High Violence Stratum	26.6	30.6	23.2	0.13
Mean Neighborhood disorder (SD)	0.64 (0.40)	0.65 (0.38)	0.63 (0.40)	0.33
Witnessed Violence in the Past Year (%)	51.9	55.6	48.7	0.094
Victimization in the Past Year (%)	33.7	41.5	27.0	≤ 0.001
Feel safe in neighborhood (%)	68.2	68.5	67.9	0.89

Social Skills Rating System

The Teacher Form of the Social Skills Rating System (SSRS; (Gresham & Elliott, 1990)) has teachers individually assess students' social skills and academic performance. The screening instrument catalogues social behavior in the educational environment (Gresham & Elliott, 1990). The Teacher Form has subscales that assess social skills, problem behaviors and academic performance. In the MORE Project, the Cooperation, Assertion, Self-Control, Internalizing, Externalizing, Hyperactivity, and Academic Competence subscales were used. The Cronbach's alphas for the subscales ranged from 0.80 to 0.93. Cronbach's Alpha for the Academic Competence scale was 0.96 (Cooley-Strickland et al., 2009).

The seven SSRS scales were dichotomized into binary indicators to indicate problem behaviors across all items. For the Externalizing, Internalizing, and Hyperactivity score, the binary indicator represents the highest quartile of problem behaviors. For the Cooperation, Assertion, Self-control, and Academic competence scales, the binary indicator represents the lowest quartile of the behaviors so that a “1” indicates a problem for all subscales. Past studies (Darney et al., 2013; Reinke et al., 2008) have taken a similar approach based on the recommendations from Farrington and Loeber (D. P. Farrington & Loeber, 2000), and a similar coding strategy will facilitate the interpretation of model results.

Neighborhood Inventory of Environmental Typology

The Neighborhood Inventory of Environmental Typology (NifETy) is an objective measure of neighborhood-block-level violence, alcohol, and other drugs (Furr-Holden et al., 2010; Furr-Holden, Smart, & Pokorni, 2008). The NifETy has 172 items that cover domains of the neighborhood environment: physical layout, structures on the block, dwelling type, youth and adult activity, physical order and disorder, social order and disorder, and the presence of violence, alcohol, and other drug indicators (Furr-Holden et al., 2010). The NifETy data for each block is collected by a two-person team of trained field raters who independently enter data on the environmental indicators into a handheld electronic device. Furr-Holden et al. (2008) provides a detailed description of the NifETy Instrument and its metric properties.

This study used a summary neighborhood disorder score that was created by replicating an exploratory factor analysis used in prior studies (Furr-Holden, Milam, Reynolds, MacPherson, & Lejuez, 2012). Eleven items (structures with broken windows, unboarded abandoned buildings, unmaintained property, trash in open spaces, broken

bottles, graffiti, noise, people yelling, public alcohol consumption, drug paraphernalia and discarded alcohol bottles) were used in the factor analysis, and the factor loadings (when the indicator was present) were added together to create the neighborhood disorder score (Furr-Holden et al., 2012).

NifETy data was only collected for a subset of students in this analysis; 11.5% of the boys were missing NifETy data and 12.9% of girls were missing NifETy data. The missing raw indicators were imputed using Stata's (StataCorp, 2013) hotdeck procedure. Imputing the missing scale scores was a two-part process. Students with missing NifETy data for whom a zip code was available were matched to students in the same zip code with complete NifETy data. The missing NifETy factor scores were replaced with the observed NifETy factor scores of a randomly selected student in the zip code. Students with missing NifETy data and no zip code available were matched to a student in the same school with complete NifETy data. A single imputed data set was created for this analysis.

Children's Exposure to Community Violence

The Children's Report of Exposure to Violence (CREV (Cooley, Turner, & Beidel, 1995)) was used to collect data on children's experience with violence in their communities. The CREV is a self-report questionnaire that assesses children's exposure to community violence; lifetime and past year versions are available. The CREV measures perceived exposure to violence, which may provide a different measure of community violence exposure compared to objective measures of violence, such as police reports (Cooley et al., 1995).

The CREV asks children about their experience with a range of violent situations in their neighborhood such as being chased or threatened, beaten up, robbed or mugged, shot,

stabbed, or seeing someone being killed (Cooley et al., 1995). The CREV also distinguishes between strangers and individuals who were familiar to the child. For example, children are asked two questions about someone in their neighborhood being beaten up: “Have you ever seen a stranger being beaten up in your neighborhood?” and “Have you have seen someone you know being beaten up in your neighborhood?”

The original version included 29 items that address violence that occurs in community settings. Following the September 11 terrorist attacks on the United States, the CREV was revised and questions about world violence and perceived exposure to terrorism were added. The CREV-Revised (CREV-R) includes the original 29 items plus world violence items; there are 45 items on the CREV-R. All of the items on the CREV-R are scored between 0 and 4 (0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day). The Total Score is derived by summing together all of the scores; higher scores indicate a high level of community violence exposure.

The baseline past year Witnessed and Victim subscales were used in this analysis. The violent events covered in the CREV include either experiencing or witnessing being beaten up, robbed, stabbed, or shot. Since both the Witnessed and Victimization subscales were highly skewed, the values were dichotomized at the median into high vs. low exposure. See Appendix A for a copy for the CREV.

Students’ perception of safety in their neighborhoods was assessed through the following question: “I feel safe in my neighborhood.” Students indicated their agreement on a four-point Likert scale (Cooley-Strickland et al., 2009). Responses were dichotomized into yes or no.

Latent class analysis using Mplus (Muthén & Muthén, 2013) was conducted to identify homogeneous subgroups of students with behavioral and academic problems. Students are classified into discrete latent classes based on their responses to measured indicators of behavioral and academic performance, which for this study were the seven SSRS binary indicators. The advantages of LCA over other clustering techniques are that LCA is model-based and can estimate measurement error. A latent class model estimates class prevalences and class-specific item response probabilities.

A series of two to five-class models were estimated to determine what number of classes best fit the data. The selection of the final model was based on a consideration of class size, fit indices including the Bayesian Information Criterion, entropy, and standardized bivariate residuals. A more detailed description of the model selection process is described in Aim 2.

A bias-corrected three-step multinomial logistical regression was used to estimate the associations between the covariates of interest and class membership (Bakk et al., 2013; Vermunt, 2010). The procedure for the bias-corrected three-step process involves first estimating the latent class model. After the model has been estimated, each individual is assigned to his or her most likely class (i.e., the class to which they have the highest probability of belonging). The classification probabilities are used to compute a classification uncertainty rate. In the final step, the covariates are added to the model. Instead of the original seven SSRS indicators, most likely class membership is added to the model as a nominal variable and the thresholds for the nominal indicators is constrained by the uncertainty rates calculated in step one and used as an indicator of latent class membership

instead of the original SSRS variables. The covariates are added and the multinomial logistic regression is conducted in the final, third step. The odds ratios from the multinomial logistic model describe the effect of a level of the covariate on the probability of class membership relative to a reference class.

The primary motivation for using the three-step estimation is that constraining the most likely class membership indicator with the classification uncertainty rates “fixes” class membership in the final step so that the latent class structure does not change after adding covariates to the model. Multinomial logistic regression can be used to estimate the associations between the covariates of interest and class membership, but the covariates do not influence the class prevalences or item-response probabilities. A similar three-step estimate procedure was used in Chapter 2 so the gender specific latent class models presented in Chapter 2 and Chapter 3 are the same.

5.4 Results

Latent Class Analysis

Separate latent class analyses for girls and boys were conducted. A three-class model was selected as the best fitting model for girls. Class 1, the High-Performing class, was characterized by low risk of problem behaviors or academic problems. The average age of girls in this class is 9.2 (0.08), 80% are black, 80% participated in the free or reduced lunch program, less than 5% were receiving special education services, and the average attendance for the baseline year was 96%. Class 2, the Poor Social Skills/Average-Performing class, was characterized by high probabilities of cooperation, self-control, and hyperactivity problems and moderate risk for academic problems. The average age of girls in Class 2 was 9.5, 89%

were African-American, 13.8% were receiving special education services, 90% participated in the free and reduced lunch program, average attendance was 95.4%. Class 3, the Internalizing/Average-Performing class, was characterized by modest risk for internalizing problems and academic problems. The average age of girls in Class 3 was 9.5, 80% were African-American, 13.1% were receiving special education services, 84% participated in the free and reduced lunch program, and average attendance was 95.2%.

A three-class model was also selected as the optimal model for boys. In the sample of boys, Class 1, the High-Performing class, was characterized by low risk of problem behaviors or academic problems. The average age of boys in this class was 9.6. 84% were black, 86% participated in the free or reduced lunch program, less than 13.5% were receiving special education services, and the average attendance for the baseline year was 96%. Class 2, the Disruptive Behavior/Low-Performing class, was characterized by high probabilities of self-control, externalizing, and hyperactivity problems and moderate risk for academic problems. The average age of boys in class was 9.5, 79% were African-American, 25% were receiving special education services, 83% participated in the free and reduced lunch program, and average attendance was 93%. Class 3, Low Social Skills/Low-Performing class, was characterized by high risk of assertion problems and modest risk for cooperation and academic problems. Brief descriptions of the latent classes and percentages of student by latent classes are provided in Table 19.

Table 19. Description of Latent Classes

Latent Class Name	Class Prevalences	Class Description
Class 1 Girls: High Performers Boys: High Performers	Girls: 56% Boys: 58%	Girls and Boys: Low risk of poor social skills, problem behaviors, or academic problems
Class 2 Girls: Poor Social Skill/Average Performers Boys: Disruptive Behavior/Low Performers	Girls: 28% Boys: 26%	Girls: High risk for cooperation, self-control, hyperactivity problems/moderate risk for academic problems Boys: High risk for self-control, externalizing, and hyperactivity problems/moderate risk for academic problems
Class 3 Girls: Internalizing/Average Performers Boys: Low Social Skills/Low Performers	Girls: 15% Boys: 15%	Girls: Modest risk for internalizing problems and academic problems Boys: high risk of assertion problems/ modest risk for cooperation and academic problems

Latent Class Regression

Following the identification of the optimal class structure for boys and girls, multinomial logistic regression was used to identify associations between neighborhood factors and membership in latent classes of classroom behavior. Analyses were again stratified by gender. To account for clustering of students by school, the standard errors were estimated using the Mixture Complex feature in Mplus (Muthén & Muthén, 2013) and all of the models were adjusted for free and reduced lunch status, race, and grade. Odds ratios and their 95% confidence intervals are reported in Tables 15 & 17. Descriptive statistics of the neighborhood covariates by class are presented in Tables 16 and 18.

Multinomial Logistic Regression Results - Girls

Girls in the Poor Social Skills/Average-Performing class had the highest rate of witnessing violence (60%) and being victims of community violence (33%). Levels of neighborhood disorder were also highest in the Poor Social Skills/Average-Performing class, and girls in this class were the least likely to feel safe in their neighborhood (~60%). Girls in the High-Performing class and Internalizing/Average-Performing class had similar rates of

witnessing violence and victimization but girls in the Internalizing/Average-Performing class had higher levels of neighborhood disorder and were less likely to feel safe in their neighborhood.

Table 20. Mean Covariate Levels by Class -- Girls

	High Performing Class	Poor Social Skills/Average Performers	Internalizing/Average Performers
Witnessing Violence (%)	44.6%	60.0%	44.8%
Victimization (%)	24.4%	33.3%	25.7%
Mean Neighborhood Disorder (SE)	0.55 (0.03)	0.64 (0.05)	0.62 (0.06)
Neighborhood Safety (%)	74.5%	59.7%	62.7%

Poor Social Skills/Average Performers vs. High Performer Class

Witnessing violence and feelings of neighborhood safety were significantly associated with membership in the Poor Social Skills/Average-Performing class. Girls in the Poor Social Skills/Average-Performing class were more likely to have witnessed community violence (OR = 1.70, 95% CI: 1.61, 5.47) and less likely to feel safe in their neighborhood than were girls in the High-Performing class (OR = 0.49, 95% CI: 0.37, 0.65). The model also suggests there is no evidence of an association between neighborhood victimization (OR = 1.15, (95% CI: 0.59, 2.25) or neighborhood disorder (OR = 1.25, 95% CI: 0.34, 4.62) and membership in the Poor Social Skills/Average-Performing class.

Table 21. Odds Ratios and 95% Confidence Intervals for Multinomial Logistic Regression

	C1 vs. C2	C1 vs. C3	C2 vs. C3
Witnessing Violence	1.70 (1.61, 5.47)	0.76 (0.27, 2.14)	0.45 (0.17, 1.16)
Victimization	1.15 (0.59, 2.25)	0.70 (0.23, 2.13)	0.6 (0.25, 1.47)
Neighborhood Disorder	1.25 (0.34, 4.61)	1.86 (0.31, 11.17)	1.49 (0.23, 9.85)
Neighborhood Safety	0.49 (0.37, 0.65)	0.44 (0.16, 1.23)	0.90 (0.39, 2.06)

Internalizing/Average performers vs. High Performing Class

There were no significant predictors of membership in the Internalizing/Average-Performing class. Neither witnessing violence (OR = 0.76, 95% CI: 0.27, 2.14) nor victimization (OR = 0.70, 95% CI: 0.23, 2.13) were significantly associated with membership in the Internalizing/Average-Performing class. However, the direction of the odds ratio suggests that girls in the Internalizing/Average-Performing class were less likely to have experienced violence in their community. Neighborhood disorder (OR = 1.86, 95% CI: 0.31, 11.17) and feeling safe in their neighborhood (OR = 0.44, 95% CI: 0.16, 1.23) were also not significantly associated with membership in the Internalizing/Average-Performing class.

Internalizing/Average Performers vs. Poor Social Skills/Average Performers

Predictors of class membership for Internalizing/Average-Performing class compared to the Poor Social Skills/Average-Performing class were also examined; none of the covariates were significant. However, the direction of the odds ratios for witnessing violence (OR = 0.45, 95% CI: 0.17, 1.16) and victimization (OR 0.69, 95% CI: 0.28, 1.31) suggests that girls in the Internalizing/Average-Performing Class may be less likely to experience violence in their community than girls in the Poor Social Skills/Average-Performing class. Neighborhood disorder (OR = 149, 95% CI: 0.23, 9.85) and feeling safe in their neighborhood (OR = 0.90, 95% CI: 0.39, 20.6) were also not significantly associated with membership in the Internalizing/Average-Performing class relative to the Poor Social Skills/Average-Performing class.

Boys in the Disruptive Behavior/Average-Performing class had the highest rate of witnessing violence (63%) and being victims of community violence (53%). Levels of neighborhood disorder were highest in the Low Social Skills/Low-Performing class, and boys in this class were the least likely to feel safe in neighborhood (66%). Boys in the High-Performing class had lower rates of witnessing violence than boys in the Low Social Skills/Low-Performing class but higher rates of victimization than the Low Social Skills/Low-Performing class. The levels of neighborhood disorder were similar in Class 1 and Class 3.

Table 22. Mean Covariate Levels by Class -- Boys

	High Performers Class	Disruptive Behavior /Average Performers Class	Low Social Skills/Low Performers Class
Witnessing Violence (%)	50.8%	63.9%	60.2%
Victimization (%)	39.3%	53.5%	29.1%
Mean Neighborhood Disorder (SE)	0.67 (0.03)	0.62 (0.05)	0.69 (0.07)
Neighborhood Safety (%)	67.9%	66.2%	75.0%

Disruptive Behavior/Average Performers vs. High Performing Class

Boys in the Disruptive Behavior/Average-Performing class were more likely to have witnessed community violence (OR = 1.68, 95% CI: 0.69, 4.07) and have been victims of community violence (OR = 1.71, 95% CI: 1.147 2.50) than boys in High Performing class. However, only victimization was significantly associated with class membership. Neither neighborhood disorder (OR = 0.82, 95% CI: 0.27, 2.53) nor feeling safe in their neighborhood (OR = 1.08, 95% CI: 0.44, 2.65) were significantly associated with membership in the Disruptive Behavior/Average-Performing class.

Low Social Skills/Low Performers vs. High Performing Class

Boys in the Low Performing class were significantly less likely to have been victims of community violence (OR = 0.49, 95% CI: 0.27, 0.88) than boys in the High Performing class. Witnessing community violence (OR = 1.80, 95% CI: 0.53, 6.10), neighborhood disorder (OR = 1.27, 95% CI: 0.26, 6.16), and feeling safe in their neighborhood (OR = 1.34, 95% CI: 0.32, 5.62) were not significantly associated with membership in the Low Performing class relative to the High Performing class.

Low Social Skills/Low Performers vs. Disruptive Behavior/Low Performers

Boys in the Low Social Skills/Low Performing class were significantly less likely to have been victims of community violence (OR = 0.28, 95% CI: 0.25, 0.42) than boys in the Disruptive Behavior/Average Performers class. Witnessing community violence (OR = 1.07, 95% CI: 0.25, 4.61), neighborhood disorder (OR = 1.54, 95% CI: 0.46, 2.37), and feeling safe in their neighborhood (OR = 1.24, 95% CI: 0.45, 3.43) were not significantly associated with membership in the Low Performing class relative to the Disruptive Behavior/Average Performers class.

Table 23. Odds Ratios and 95% Confidence Intervals for Multinomial Logistic Regression

	C1 vs. C2	C1 vs. C3	C2 vs. C3
Witnessing Violence	1.68 (0.69, 4.07)	1.80 (0.53, 6.10)	1.07 (0.25, 4.61)
Victimization	1.71 (1.17, 2.50)	0.49 (0.27, 0.88)	0.28 (0.25, 0.42)
Neighborhood Disorder	0.82 (0.27, 2.53)	1.27 (0.26, 6.16)	1.54 (0.46, 2.37)
Neighborhood Safety	1.08 (0.44, 2.65)	1.34 (0.32, 5.62)	1.24 (0.45, 3.43)

This analysis explored possible associations between neighborhood factors and children's patterns of academic behaviors. Specifically, this study investigated whether a child's level of neighborhood disorder, exposure to community violence, and feeling of neighborhood safety predicted membership in latent classes of academic behavior. Analyses were conducted separately for girls and boys; the nature of the latent classes and the significant predictors of class membership varied by gender.

Summary of Major Findings

Witnessing community violence and feeling unsafe in their neighborhood were both significantly associated with membership in the latent class of girls that was characterized by low social skills and average achievement. In the sample of boys, direct victimization increased the risk of being in the disruptive behavior/low-performing class and lowered the risk of being in the low social skills/low-performing class. Neighborhood disorder was not a significant predictor of class membership for boys or girls.

For boys, these findings suggest that direct community violence exposure has a stronger impact on patterns of externalizing or problem behaviors than on social skills. Whereas for girls, the reverse may be the case; witnessing violence in their community and feeling safe in their neighborhood may have a stronger impact on patterns of social skills development and internalizing problems than on problem behaviors. This is an important finding as much of the available research has focused on community violence exposure and subsequent aggressive behavior (Cooley-Strickland et al., 2009; McMahon et al., 2013). As was the case in this study, boys generally experience higher levels of victimization (Richters

& Martinez, 1993). As expected by the current literature, for boys, victimization was associated with patterns of problematic behavior. These findings indicate that boys and girls have different experiences with community violence, which in turn is associated with different outcomes. Moreover, despite experiencing less of the most severe form of community violence through direct victimization, community violence still may have important implications for social development in girls. Fewer studies have examined associations between community violence and social skills and the significant association between witnessing violence patterns of low social competence in girls warrants further research (McMahon et al., 2013). Understanding that patterns of classroom behaviors that are influenced by community violence include more than just aggressive or disruptive behavior is important information for teachers and clinicians.

Finally, these findings are consistent with past studies that have not found significant associations between neighborhood disorder and academic achievement as well as studies that show associations between victimization and academic functioning (N. Bowen & Bowen, 1999; Cooley-Quille et al., 1995; Milam et al., 2010). While this study did not directly measure the association between neighborhood factors and objective measures of academic performance, the latent classes do represent classroom competency. These findings suggest that neighborhood disorder influences overall classroom competency by increasing the likelihood of direct exposure to violence, either by witnessing or being a victim of community violence. The findings that witnessing or experiencing violence influences patterns of academic behaviors is consistent with an ecological model that suggests that the neighborhood microsystem influences student achievement at school. Other neighborhood factors such as poverty and residential mobility may have more direct effects on academic competences and should be studied in the future.

This study was limited by the sample characteristics. First, because the analysis was stratified by gender, the sample sizes for the separate analyses were moderate (approximately 300 students). Second, as all of the students in this sample were from Baltimore City and were primarily African-American, these findings may not generalize to other areas, even other urban areas. The primary methodological limitation of this study is that the indicators used to develop the latent classes relied on teacher assessments of student behaviors and competencies. Teachers are generally considered reliable sources of this type of data, but future studies should consider other potential sources of information on academic behaviors, such as student and peer ratings. Finally, this study limited its focus to neighborhood influences on academic behaviors; future analyses should be expanded to consider the joint effects of neighborhood, school-level, and familial factors on patterns of academic behaviors.

Chapter 6. Conclusions

6.1 Overview of Findings

Aim 1. This study used a community-based sample of urban, elementary school children to assess the joint and relative influences of community violence exposure and school quality on math proficiency levels. The study used self-reported exposure to community violence and Adequately Yearly Progress as measure of school quality to categorize students into four groups: high exposure to violence/low performing school, low exposure to violence/low performing school, high exposure to violence/high performing school, and low exposure to violence/high performing school. Theoretical and empirical evidence suggests that students in the high exposure to violence/low performing school category have the highest risk of academic failure so this category was selected as the target exposure category. Propensity score weights were used to examine three pairwise comparisons with high exposure to violence/low performing school sample as the reference group. There were not significant differences in math proficiency between the high exposure to violence/low performing school group or the low exposure to violence/low performing school group. There were significant differences in math proficiency levels in the high exposure to violence/low performing school vs. high exposure to violence/high performing school and high exposure to violence/low performing school vs. low exposure to violence/high performing school comparisons. The mean differences from these two pairwise comparisons were comparable suggesting that most of the gains in math proficiency were from attending a high performing school instead of a reduction in exposure to community violence.

Aim 2. This study developed gender-specific latent classes of academic behaviors that included academic competences, social and self-regulation skills, and behavioral problems. Binary variables that indicated problems with academic competency, cooperation, assertion, self-control, internalizing problems, externalizing problems, and hyperactivity were used to create separate latent classes for boys and girls. A three-class model was the best fitting solution for boys; the classes included a High Performing class, a Disruptive Behavior/Low Performing class, and a Low Social Skills/Low Performing class. Boys in the High Performing class performed better on their concurrent Reading and Math MSA standardized test scores but there were no significant differences between the classes in the Year 2 test scores for reading or math. A three-class solution was also the best fitting model for the sample of girls; the classes included a High Performing class, a Poor Social Skill/Average Performing class, and an Internalizing/Average performing class. There were no significant differences in reading or math standardized test scores between Poor Social Skills/Average Performing class and the Internalizing/Average Performing class at either time point. The girls in the High Performing class consistently performed better on the MSA reading and math test than girls in the Poor Social Skills/Average Performing class and the Internalizing/Average Performing class at both time points.

Aim 3. This analysis used latent class regression to look at significant predictors of the latent classes developed in Aim 2. The association between perceived and objective measures of neighborhood violence and feelings of neighborhood safety and latent class membership were tested. For boys, relative to the High Performing class, community violence victimization was significantly associated with membership in the Disruptive Behavior/Low Performing class. There were no significant predictors of membership for the Internalizing/Average performing class. For girls, relative to the to the High Performing

class, witnessing neighborhood violence and feelings of neighborhood safety were significantly associated with membership in the Poor Social Skills/Average Performing class; however, the overall size of the effect was small for both witnessing violence and feelings of neighborhood safety. Witnessing community violence had increased the risk of belonging to the Poor Social Skills/Average Performing class, but feeling safe in their neighborhood reduced the risk of belong to the Poor Social Skills/Average Performing class. There were no significant predictors of memberships for the Internalizing/Average Performing class.

Summary

In summary, the main findings of this dissertation are: 1) school context is an important influence on academic achievement in elementary school, even for children who experience high levels of violence in their communities; 2) boys and girls exhibit different patterns of academic competences, behavioral problems, and social skills; children who exhibit the competencies across all three domains perform best on standardized tests; and 3) witnessing violence and feelings of neighborhood safety are associated with patterns of academic competences, behavioral problems, and social skills for girls and victimization is associated with academic competencies behavioral problems, and social skills for boys.

There are several implications of these research aims. First, well-designed interventions for improving school quality could have a significant impact on reducing persistent inequalities in educational attainment. Early educational achievement has significant life course implications so the effect of improvements in school quality would likely extend beyond educational outcomes. Early academic problems are associated with a higher risk of social and emotional problems including anxiety and major depressive, delinquent and antisocial behavior, and substance use, including tobacco, illicit drugs, and

marijuana (Bachman et al., 2007; Velez et al., 1989). Given the range of mental and physical health outcomes that are associated academic achievement, the impact of school-level interventions may also contribute to improvements in public health. Second, school-level interventions should incorporate components that address both academic and social and emotional competency. Social and emotional skills, disruptive/problematic behavior, and cognitive ability all contribute to overall school success and urban children living in high poverty neighborhoods may have a higher risk of co-occurring problems with disruptive behavior, social and emotional competency, and academic ability, thus for interventions to be truly effective at improving academic outcomes, all three domains must be addressed.

6.2 Limitations

It is important to acknowledge several overall limitations of these analyses. First, all of the analyses in this dissertation used data from a single urban area, which may limit generalizability to other geographic areas. Secondly, Aim 2 and Aim 3 relied on teacher reports of classroom behavior; however, teacher reported data was only available for a subset of the full MORE Project sample. For the first cohort, 83% of participants have teacher reported measures at the baseline data collection. Eight-eight percent of students in the second cohort had teacher reported data at the baseline data collection. If there were systematic differences between the teachers who agreed to participate in the study and those who did not this may lead to biases in the conclusions made from this data. However, the overall teacher response rate for the full sample was high, which should minimize concerns about teacher selection bias.

All of the primary analyses in this dissertation were cross-sectional so temporality is another concern. All of the observed associations may have been working in the reverse

direction. For example, children who experience early academic failure may be at increased risk for experiencing community violence through deviant peer associations and more unsupervised time in their neighborhood due to low participation in extra-curricular activities. Understanding the direction of associations between community violence and academic performance is important for prevention and intervention efforts. Unfortunately, given the nature of the data collection schedule for the MORE Project sample, it was not possible to extend these analyses into longitudinal models. Future studies of elementary aged children at high risk for community violence exposure should assess the persistence of the effects of community violence exposure on academic outcomes to better understand the direction of the association and the consistency of the association across developmental periods.

6.3 Strengths

Despite these limitations there are several strengths of this study. First, the study used a community-based epidemiologic sample of urban children. The students in the MORE Project were recruited from schools that represented three different violence strata, which ensured variability in the neighborhood risk factors.

Additionally, this dissertation examined associations between community violence exposure and academic outcomes, which is an area where more research is still needed (Cooley-Strickland et al., 2009; Schwartz & Gorman, 2003). Aim 1 estimated the joint and relative effects of community violence exposure and school effects on academic outcomes. From an ecological perspective, the influences of the social contexts in a child's ecology are not static; the transactional processes across the multiple, nested ecologies are important drivers of youth development and there are limited studies that have examined both in the

same sample. Aims 2 and 3 used person-centered methods to develop patterns of students based on a group of core competencies that support academic achievement. The ability to distinguish between students who are at high-risk of academic failure based on patterns of problem behavior is a key step in interventions that target students with the higher risk for failure.

Finally, this study was able to use multiple sources of data throughout all three aims. Aim 3 incorporated perceived and objective measures of community violence exposure; Aims 2 and 3 used teacher reports of classroom behaviors and competencies, and Aim 1 used student and school level data.

6.4 Public health Significance

The public health significance of this research is two-fold. First, community violence exposure is a highly prevalent risk factor for urban children. Community violence persists as a major public health problem in the United States despite considerable attention from researchers, policy makers, law enforcement officials, and community-based organizations to prevent both its occurrence and its impacts on children (Cooley-Strickland et al., 2009; *World report on violence and health*, 2002). National estimates suggest that approximately 9.8 million American youth have witnessed some form of violence in their neighborhood (Zinzow et al., 2009). When examined in greater detail, one-third of girls and one-half of boys in a national sample have witnessed at least one violent act in their neighborhood (Kilpatrick et al., 2003).

In one of the original studies on children's exposure to community violence, Bell and Jenkins (1993) estimated that 26% of children in Chicago had witnessed a shooting in their neighborhood and 30% had witnessed a stabbing incident. In the same sample, Bell and Jenkins also found that over three-fourths of children had witnessed at least one violent act

(e.g. robbery, stabbing, shooting incidence) in their neighborhood (Bell & Jenkins, 1993).

Even more concerning, these high rates of exposure persist despite a general decline in crime (Stein et al., 2003). Therefore, while the overall effects of community violence exposure on academic outcomes of elementary age children may be small, the cumulative impact at the population level may still be quite large given that is such a prevalent risk factor (Rose, 1985).

The population level effects become especially important when one considers them in conjunction with the persistent achievement gap in this country. Race/ethnicity and social-economic status remain two of the strongest predictors of academic achievement in the United States. National estimates show that 52% of black 4th grade students compared to 22% of White 4th grade students have not achieved grade-specific reading proficiency levels (National Center for Education Statistics (NCES), 2009). Data from the Early Childhood Longitudinal Study-Kindergarten Cohort (ECLS-K) study shows that, on average Black kindergarten students score 0.4 standard deviations lower on reading achievement tests than their White counterparts and by the end of elementary school the gap has widened to 0.8 standard deviations (Parkinson, 2012). While the overall direct effects of community violence on achievement may be small, they may contribute to a larger, dynamic process driving the widening achievement gap in young children. Improving educational outcomes for urban, minority children is an important goal for society as educational attainment is an important determinant of health outcomes, has strong associations with adult professional opportunities, and patterns of inequality in education mirror larger patterns of inequality in society.

Appendix A. The Children's Report of Exposure to community Violence

Item	Response Options
Have you ever seen somebody being beaten up on TV, video games, or in the movies?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Have you ever been told that a stranger was beaten up?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Have you ever seen a stranger being beaten up?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Where did this happen?	1=In your home, 2=In your school, 3=In your neighborhood (where you live), 4=In a relatives neighborhood (not where you live), 5=Other, 999=NA
Have you ever seen somebody being chased or seriously threatened on TV, video games, or in the movies?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Have you ever been told that a stranger was chased or seriously threatened?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Have you ever seen a stranger being chased or seriously threatened?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Where did this happen?	1=In your home, 2=In your school, 3=In your neighborhood (where you live), 4=In a relatives neighborhood (not where you live), 5=Other, 999=NA
Have you ever seen somebody being robbed or mugged on TV, video games, or in the movies?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Have you ever been told that a stranger was robbed or mugged?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Have you ever seen a stranger being robbed or mugged?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Where did this happen?	1=In your home, 2=In your school, 3=In your neighborhood (where you live), 4=In a relatives neighborhood (not where you live), 5=Other, 999=NA
Have you ever seen somebody being shot or stabbed on TV, video games, or in the movies?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Have you ever been told that a stranger was shot or stabbed?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Have you ever seen a stranger being shot or stabbed?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Where did this happen?	1=In your home, 2=In your school, 3=In your neighborhood (where you live), 4=In a relatives neighborhood (not where you live), 5=Other, 999=NA
Have you ever seen somebody being killed on TV, video games, or in the movies?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Have you ever been told that a stranger was killed?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Have you ever seen a stranger being killed?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Where did this happen?	1=In your home, 2=In your school, 3=In your neighborhood (where you live), 4=In a relatives neighborhood (not where you live), 5=Other, 999=NA
Have you ever been told that somebody you know was beaten up?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day

Where did this happen?	1=In your home, 2=In your school, 3=In your neighborhood (where you live), 4=In a relatives neighborhood (not where you live), 5=Other, 999=NA)
Have you ever seen somebody you know being beaten up?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Have you ever been told that somebody you know was chased or seriously threatened?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Have you ever seen somebody you know being chased or seriously threatened?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Where did this happen?	1=In your home, 2=In your school, 3=In your neighborhood (where you live), 4=In a relatives neighborhood (not where you live), 5=Other, 999=NA
Have you ever been told that somebody you know was robbed or mugged?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Have you ever seen somebody you know being robbed or mugged?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Where did this happen?	1=In your home, 2=In your school, 3=In your neighborhood (where you live), 4=In a relatives neighborhood (not where you live), 5=Other, 999=NA
Have you ever been told that somebody you know was shot or stabbed?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Have you ever seen somebody you know being shot or stabbed?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Where did this happen?	1=In your home, 2=In your school, 3=In your neighborhood (where you live), 4=In a relatives neighborhood (not where you live), 5=Other, 999=NA
Have you ever been told that somebody you know was killed?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Have you ever seen somebody you know being killed?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Where did this happen?	1=In your home, 2=In your school, 3=In your neighborhood (where you live), 4=In a relatives neighborhood (not where you live), 5=Other, 999=NA
Have you ever been beaten up?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Where did this happen?	1=In your home, 2=In your school, 3=In your neighborhood (where you live), 4=In a relatives neighborhood (not where you live), 5=Other, 999=NA
Have you ever been chased or seriously threatened?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Where did this happen?	1=In your home, 2=In your school, 3=In your neighborhood (where you live), 4=In a relatives neighborhood (not where you live), 5=Other, 999=NA
Have you ever been robbed or mugged?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Where did this happen?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
Have you ever been shot or stabbed?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day

Where did this happen?	0=No Never, 1=One Time, 2=A Few Times, 3=Many Times, 4=Every Day
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Appendix B. Variables Used to Estimate Propensity Scores

The *Neighborhood Inventory for Environmental Typology* was used to collect objective measures of the neighborhood environment (NifETy: (Furr-Holden et al., 2008). The NifETy provides contextual measures of children's exposure to community violence and environmental indicators of the physical and social disorder in the child's neighborhood. Independent evaluators are trained to systematically assess physical layout of the block, types of structures present, adult and youth activity, physical order and disorder, social order and disorder, violence indicators, and alcohol and other drug indicators. The neighborhood incivilities items (i.e., physical disorder, social disorder, violence, and alcohol and drug indicators) were assessed as either being present or absent (coded as 0 or 1). NifETy data was collected at the residential block level for children in the MORE study. The NifETy uses an epidemiological approach to study neighborhood characteristics that may be associated with violence, crime, and drug and alcohol use; indicators were designed to be quantifiable, replicable, and to be used longitudinally (Furr-Holden et al., 2008).

The NifETy includes 114 quantitative and 15 qualitative items that create seven subscales: (1) physical layout of the block face, (2) types of structures, (3) adult activity, (4) youth activity, (5) physical disorder and order, (6) social disorder and order, and (7) violence and alcohol and other drug indicators (Furr-Holden et al., 2008).

The NifETy's reliability and validity was assessed in an independent sample; it has excellent psychometric properties. The interclass correlation for the Total Scale was 0.84. Cronbach's alpha for the subscales ranged from 0.27 to 0.90. The inter-rater reliability and validity were both in the acceptable to good range (Furr-Holden et al., 2008).

Students' perception of safety in their neighborhoods and in school was assessed through the following question: "I feel safe in my neighborhood," and "I feel safe in school." Students indicated their agreement on a four-point Likert scale (Cooley-Strickland et al., 2009). Responses were dichotomized to yes or no.

This study used a summary neighborhood disorder score that was created by replicating an exploratory factor analysis used in prior studies (Furr-Holden, Milam, Reynolds, MacPherson, & Lejuez, 2012). Eleven items (structures with broken windows, unboarded abandoned buildings, unmaintained property, trash in open spaces, broken bottles, graffiti, noise, people yelling, public alcohol consumption, drug paraphernalia and discarded alcohol bottles) were used in the factor analysis, and the factor loadings (when the indicator was present) were added together to create the neighborhood disorder score (Furr-Holden et al., 2012).

The *Baltimore Substance Use Scale* (BSUS; (Chilcoat & Anthony, 1996; Chilcoat, Dishion, & Anthony, 1995; Kellam & Anthony, 1998) was used to measure substance exposure and use. The BSUS was developed for use in longitudinal community-epidemiological studies with elementary and middle school students. The instrument asks students about the knowledge, current use, and anticipated use of tobacco, alcohol, marijuana, crack cocaine, heroin, inhalants, and stimulants (Cooley-Strickland et al., 2009). Since the individual questions reflect intentions and drug use patterns, reliability coefficients were not calculated for the MORE Project (Cooley-Strickland et al., 2009).

The Teacher Form of the *Social Skills Rating System* (SSRS; (Gresham & Elliot, 1990)) has teachers individually assess students' social skills and academic performance. The screening instrument catalogues social behavior in the family and educational environment (Gresham & Elliott, 1990). The Teacher Form has subscales that assess social skills, problem

behaviors, and academic performance. There are 57 items that use a three-point frequency and importance scale. The raw scores from the Teacher Form are converted into gender and age-normed standard scores for social skills, problem behaviors, and academic competence ($M = 100$, $SD = 15$, (Benes, 1995)). The standard scores come from a large standardized sample, which included regular students, special education students, and ethnic minority students (Benes, 1995).

Parenting practices were assessed with the *Parenting Practices Scale* (PPS: ((Strayhorn & Weidman, 1988)). The instrument asks parents/caregivers to indicate how frequently they had engaged in positive, developmentally appropriate interactions and communications with their child and how often they had applied discipline/punishment and its effectiveness in the last month. These two sets of questions correspond to the two subscales: the Parent Involvement subscale and the Discipline subscale. In the MORE Project, the Cronbach's α s are 0.79 for the Parental Involvement subscale and 0.63 for the Discipline subscale (Cooley-Strickland et al., 2009).

School Connectedness was assessed with the *Sense of School Membership Scale* (Goodenow, 1993). Students were asked four questions, (1) I feel like I fit in at this school, (2) The teachers here respect me; (3) I try hard at school; and (4) In general, I like school. Students were asked to give their response on a four-point Likert scale (1=Disagree A Lot, 2=Disagree, 3=Agree, 4=Agree A Lot) to indicate the degree to which they agreed with each question. In past research, the instrument had a Cronbach's α that ranged from 0.77 to 0.88 (Dahlberg, Toal, Swahn, & Behrens, 2005; Goodenow, 1993). Cronbach's α was 0.57 in the MORE Project (Cooley-Strickland et al., 2009).

Youth's self-rated mental health problems were assessed with the *Youth Self-Report*. The Youth-Self Report (YSR: (Achenbach, 1991)) is a self-reported measure of

competencies and problems that the child has experienced over the last six months (Achenbach, 1991). The YSR has been normed in large multiethnic youth samples from various socioeconomic levels (Achenbach, 1991). The test-retest reliabilities ranged from 0.47 to 0.79 and the internal consistencies had a range of 0.71 to 0.95 (Achenbach, 1991). For elementary school students (i.e. students below 5th grade), it is recommended that YSR items be read aloud to student, and the MORE Project research protocol complied with this recommendation (Cooley-Strickland et al., 2009). The YSR standard scores (T-scores; Mean = 50; SD = 10) were used in the MORE Project. The Withdrawn and Anxious/Depressed subscale were used in this analysis. Cronbach's Alpha for the Total Score was 0.92 (Cooley-Strickland et al., 2009).

The *Multicultural Events Schedule for Adolescents* (MESA: (Gonzales, Gunnoe, Samaniego, & Jackson, 1995) is a measure of adverse life events and hassles for inner city multiethnic youth. The instrument was normed on White, African-American, and English- and Spanish-speaking Mexican American adolescents (Gonzales et al., 1995). The instrument includes 84 items and their occurrence over the past three months. The total life events score is based on the total number of events with higher scores indicating more stressful life events and hassles. The Family Trouble/Change, Family Conflict, Peer Hassles/Conflict, School Hassles, and Economic Stress subscales were used in this analysis. In the MORE Project, Cronbach's alpha for the total score was 0.90 (Cooley-Strickland et al., 2009).

Academic records from the Baltimore City Public School System (BCPSS) for the 2006-2007, 2007-2008, and 2008-2009 academic years were linked to the MORE Project records. Data on attendance, grade, special education status, limited English proficiency

status, free and reduced lunch services, and Maryland School Assessment (MSA) math and reading scores were available.

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Curriculum Vita

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Biosketch

Sarah Naeger, Ph.D MPH, CPH is a graduate of the Department of Mental Health in the Johns Hopkins University Bloomberg School of Public Health. Sarah received the NIDA Drug Dependence Epidemiology Training Fellowship in August 2010. As a doctoral student, Ms. Naeger has completed a rigorous series of coursework in quantitative research methodology which included epidemiological research methods, longitudinal and multilevel modeling, structural equation modeling, and propensity score matching for causal inference. Her primary research interest is in exploring the relationship between academic performance and mental health outcomes. Her primary mentor at Johns Hopkins is Dr. Elizabeth Stuart. She received her Masters of Public Health from the University of Minnesota.

Prior to beginning her doctoral studies Sarah was a federal contractor for the Division of Prevention, Traumatic Stress, and Special Programs at the Substance Abuse and Mental Health Services Administration. At SAMHSA, she supported evaluation activities for the Division's violence and suicide prevention grant programs. Sarah also has extensive experience in public health emergency preparedness policy at both the state and Federal level. She received her Masters of Public Health from the University of Minnesota.

Education

PhD, Public Mental Health

Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland

Dissertation: Associations between Community Violence and Academic Competency in Urban Elementary School Children.

Advisor: Elizabeth Stuart

Relevant Coursework: Statistical Methods for Public Health, Epidemiological Methods, Psychiatric Epidemiology, Prevention of Mental Disorders, Statistics for Psychosocial Research: Measurement, Statistics for Psychosocial Research: Structural Equation Modeling, Analysis of Longitudinal Data, Causal Inference Methods for Medicine and Public Health, Multi-leveling Modeling for Public Health, Advanced Methods for Cohort Studies (Survival Analysis), Fundamentals of Program Evaluation, Research Evaluation Methods for Health Policy

Masters of Public Health (MPH), Epidemiology

University of Minnesota, Minneapolis, Minnesota

BS, Political Science

Truman State University, Kirksville, Missouri

Work Experience

Research Assistant

Johns Hopkins School of Education, Baltimore Education Research Consortium
February 2012 to Present

- Developed propensity score matching models for on-going evaluation projects
- Supported data management and statistical analysis in Stata, SPSS, and R
- Provided logistical support and coordination for data collection and management from multiple evaluation sites
- Consolidated data and program summaries from multiple grant sources
- Contributed to reports and presentations for both technical and non-technical audiences

Program Analyst, Data and Evaluation

Federal Business Services, Inc.

August 2008 to August 2010

- Provided on-site support to the Substance Abuse and Mental Health Services Administration's (SAMHSA) Division of Prevention, Traumatic Stress, and Special Programs
- Compiled the Division's Office of Management and Budget Information Request packages
- Supported the oversight and management of the Division's cross-site national evaluations for the Safe Schools/Healthy Students and Garrett Lee Smith Suicide Prevention programs
- Collected and documented lessons learned from the *Linking Adolescents at Risk for Suicide to Mental Health Services* grant program
- Assisted with the management, collection and documentation of the Division's grantee data including performance reports and Government Performance and Results Act (GPRA) data
- Developed and presented data and evaluation training courses for Division staff
- Compiled and organized materials on on-going evaluations in response to requests from Division staff

Senior Analyst, Public Health Preparedness

Association of State and Territorial Health Officials (ASTHO)

October 2005 to August 2008

- Planned and developed quantitative and qualitative analyses to advance ASTHO preparedness policy priorities
- Researched and wrote technical reports on state-to-state mutual aid and disaster recovery planning
- Provided staff support to the ASTHO supported Directors of Public Health Preparedness (DPHP)
- Managed the development of information sharing tools for state public health preparedness programs
- Supported and participated in the national workgroup developing performance measures for the CDC Public Health Emergency Preparedness cooperative agreement
- Responded to requests for information from ASTHO member agencies, staff, partners, and the general public

Teaching Experience

- Spring 3rd Quarter 2013: Teaching Assistant, Causal Inference Methods for Public Health
- Fall 1st Quarter 2013: Teaching Assistant, Statistical Reasoning for Public Health I
- Fall 1st Quarter 2013: Teaching Assistant, Drug Dependence Epidemiology
- Fall 2nd Quarter 2013: Teaching Assistant, Statistical Reasoning for Public Health II
- Fall 2nd Quarter 2013: Teaching Assistant, Statistics For Psychosocial Research: Structural Models
- Spring 3rd Quarter 2014: Teaching Assistant, Causal Inference Methods for Public Health

Computer Skills

- Statistical Packages: Stata, R, Mplus, SAS
- Operating systems: Macintosh, Windows
- Applications: SharePoint, Word, Excel, Powerpoint

Specialty Certifications

- 2013 Certification in Public Health (CPH)

Publications and Presentations**Manuscripts under Review**

- Mac Iver, M., Sheldon, S., **Naeger, S.**, Clark, E. Mentoring Students Back On-Track to Graduation: Program Results from Five Communities.

Manuscripts in Preparation

- Ostrow, L., **Naeger, S.**, & Steinwachs, D. Medicaid reimbursement of mental health peer-run organizations: Results of a national survey.
- Mauro, P. M, McCart, R., **Naeger, S.**, Sheidow, A.J., Letourneau, E. J. Family Engagement in risk reduction treatment for adolescents in juvenile drug courts.

Conference Presentations

- Mauro, P. M, McCart, R., **Naeger, S.**, Sheidow, A.J., Letourneau, E. J Caregiver and youth engagement in mandated juvenile drug treatment: Influence on substance use. Oral presentation for the 2014 annual meeting of the College on Problems of Drug Dependence

Conference Posters

- **Naeger, S.** (2012, June). A latent class analysis of safe and drug free schools. Poster session submitted to the 2012 annual meeting of the College on Problems of Drug Dependence.
- **Naeger, S** (2013, June). Association between perceived and objective measures of community violence exposure: an application of generalized boosted modeling. Poster session submitted to the 2013 annual meeting of the College on Problems of Drug Dependence.
- **Naeger, S** (2014 May) Teachers' Rating of Classroom Competence and Correlations with Objective Measures of Performance. Poster session submitted for the 2014 annual meeting of Society for Prevention Research.

Other Publications

Editor-in-Chief, *Issues at AMUN*, American Model United Nations, Inc., 2012, www.amun.org

Editor-in-Chief and contributing author, *Issues at AMUN*, American Model United Nations, Inc., 2011, www.amun.org

Editor, *Issues at AMUN*, American Model United Nations, Inc., 2010, www.amun.org

Editor and contributing author, *Issues at AMUN*, American Model United Nations, Inc., 2009, www.amun.org

Editor-in-Chief and contributing author, *Issues at AMUN*, American Model United Nations, Inc., 2008, www.amun.org

Contributing author and editor, *Model UN in a Box Simulation Guide*, American Model United Nations, Inc., 2008, www.amun.org

Editor-in-Chief and contributing author, *Issues at AMUN*, American Model United Nations, Inc., 2007, www.amun.org